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UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

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JAN 7 1932

CHATS WITH THE WEATHER MAN. Friday, Jan. 8, 1932

ANNOUNCEMENT: How cold was it this morning? We were arguing about that, when who should show up but our old friend, Ob. Server. He said, that from what the specialists of the U. S. Weather Bureau tell him ---- But I'll let him tell you what they told him about these tricky thermometers ---- Well, Mr. Ob. Server? ---

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First thing, let's settle this argument.

How cold is it?

I know how these arguments go ---- at least, how they used to go in our neighborhood.

Many a time we've tried to settle how cold it was, by the simple process of consulting the thermometer.

The way it worked out, that just gave the argument a fresh start. My thermometer might say one thing. And my neighbor's say something else. I thought mine was right. He knew his was; although it registered several degrees different from mine.

Then we might agree to take the U.S. Weather Bureau report for it; only to find it didn't back up either one of us. Then we would either cuss out each other, or our thermometers, or the Weather Bureau, just according to the way we were feeling that day.

After talking with Mr. B. C. Kadel, chief of the instrument division, of the U. S. Weather Bureau, I've come to understand that we may have all three been right. On a still cold night, temperatures of the air may differ by as much as ten degrees within short distances. The same thing might be said of a still, hot summer afternoon.

Those different conditions, Mr. Kadel says, are real; so you have no need to distrust your thermometer because it disagrees with your neighbor's thermometer or with the official U. S. Weather Bureau report.

Of course, if there is a good stiff breeze blowing, the air is better mixed and more uniform in temperature, and thermometers in the same neighborhood should agree more closely.

Because of the local differences in air temperatures, Mr. Kadel tells me, meteorologists have had to agree upon an ideal way to expose thermometers so as to compare the records of one location with another.

They have decided that the ideal exposure of a thermometer is five or six feet above grass-covered ground, with a thermometer housed in a covered or screened inclosure of wood slats so arranged as to keep off sun, rain, and radiation, and at the same time allow free circulation of the air.

You have probably noticed some of those kind of shelters around Weather Bureau stations. That's the ideal location. But like other ideals, the chief of the instrument division says, it is a hard one to realize.

For instance, how could you place a thermometer above grass in a desert? And what's still more to the point, how are you going to place it above grass in the downtown section of a city? We simply can't do it. But we can always keep that ideal in mind and choose the nearest approach to it we can get.

In fact, the United States Weather Bureau itself has about 150 of its thermometers in various parts of the country exposed on roofs of buildings. In such cases, board floor are interposed to screen off the effects of the heated roof.

Even so, thermometers on roofs and other high places are not satisfactory. On a still clear night, a killing frost may damage vegetation on the ground or on lower land when the high-up thermometer registers well above freezing.

Although the Weather Bureau has been forced to put 150 of its thermometers on roofs, it has nearly 5,000 thermometers exposed at five or six feet above the ground. These thermometers are its main reliance in keeping tab on temperatures.

The thermometer had to be five or six feet above ground to get well away from the chief effects of the heat radiated from the ground.

But where are we going to put that thermometer we have at home? The one we use for getting the temperature outside the house; for that's the kind we are talking about now.

Mr. Kadel suggests that if you have a north porch, hang it there, so as to get away from the sun heated air of the south side of the house. And here's a good point, I know I used to neglect. He says hang your thermometer an inch or two away from the wall. The idea is to hang it in the air. It is the air temperature you want, not the temperature of the wall. Of course, you can't get away from the effect of walls and the like, or even the effect of the thermometer itself, altogether.

But if you hang the thermometer an inch or two away from the wall on a north porch screened from the sky by the porch roof, you can protect it fairly well from its own tendency to become heated or cooled without providing the covered enclosure we were talking about. And when a good stiff breeze is blowing to mix the air thoroughly, the results should be pretty much the same all over town, from well located thermometers.

Here's a good rule. The most comfortable place for an individual outside on a winter day is probably the poorest place to hang the thermometer.

Now as to the choice of the thermometer. The mercury or alcohol in glass thermometer is the kind that's most common. That kind has stood the test of 300 years of use; so it must be a pretty fair kind of thermometer.

But there are all sizes. Mr. Kadel gave me a few simple principles to keep in mind in buying any of the good thermometers now to be had at a fair price.

As a rule, the smaller sizes are better than the great big ones. The Easy-to-Read kind are not generally the most accurate. The bulb must be small enough to respond to temperature changes within a few minutes. If the bulb is too big, the thermometer will be too slow. A drop in temperature will come along long before the thermometer finds it out.

The scale should be long enough so it can be read easily. And the space around the bulb must be open so the air can circulate about it. In the higher priced thermometers the scale is etched on the glass itself. If the graduations are on the back piece, then you must make sure that the tube can't slip up or down on the scale.

If you doubt your thermometer, put it in a vessel containing melting snow or shaved ice. After a few minutes, it should read 32 degrees.

To test other parts of the scale, you need to compare the thermometer in question in a liquid bath with another thermometer you know to be accurate. Generally speaking, Mr. Kadel tells me, you can rely on those on the market as being fairly accurate.

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ANNOUNCEMENT: Our old Ob. Server has just told us of his chat with the chief of the instrument division of the United States Weather Bureau. They talked about our old standby, the thermometer. Two weeks today Station _____ will present another of these chats with the weather man.

UNITED STATES DEPARTMENT OF AGRICULTURE
Radio Service
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CHATS WITH THE WEATHER MAN

RELEASE Friday, January 22, 1932

ANNOUNCEMENT: Now for another chat with the weather man. Our old friend, Ob. Server, has been talking with the chief of the river and flood division of the United States Weather Bureau about the waters now flooding certain sections of the South ----- What about those floods anyway, Mr. Observer?

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Rains come before floods, of course.

So before we get to talking about those floods which have been going on down in Mississippi and Louisiana for some weeks now, let's refresh our memories with a little recent rain history.

You recall about the middle of December, we had some unusually heavy rains in the south central part of this country of ours. Those rains were not widespread enough to cause a flood in the Mississippi River. There were no floods in the Arkansas River, or the White River, or the Ohio, or the Missouri, and consequently no floods in the Mississippi River proper.

The floods have been in the interior rivers chiefly, the Tallahatchie and Yazoo rivers of Mississippi, the Red River, and the Ouchita River in Louisiana.

I wish you could see a map of that country. Mr. M. W. Hayes, chief of the river and flood division of the United States Weather Bureau, who told me about the forecasts of those floods, showed me what it is like. I had trouble even keeping track of some of those rivers on the map. Take the Tallahatchie or the Yazoo for example. They turn, and twist, and divide and wind around worse than one of those labyrinth puzzles you've seen in the papers. In fact, I venture to say if a stranger started down stream in a boat on one of those rivers he would lose himself a dozen times before he would ever reach the mouth of the river. The country is rather level, as you may have noticed from the pictures, and those streams are old streams which have changed their beds often.

Some of you who may have lived on the upper reaches of rivers and mountain streams may think of a flood as something sudden, but in that low level country where those rivers are now out of their banks a flood is a much more leisurely proposition.

On December 19, the Weather Bureau forecast the flood in the Tallahatchie and Yazoo Rivers of Mississippi and Ouchita in Louisiana. Here is what the forecaster said about that rise. "It will continue about two weeks probably reaching flood stage of forty feet late in December."

That message went out by wire and radio and mail. Everybody in the area expected to be flooded had ample warning, and time to take all possible precautions toward saving livestock and other property.

At the time that ten days advance notice was given, Mr. Hayes says, it looked as if the trouble would be over by the last of December. But more rain fell. And it fell fast.

You understand, in this flood business, it is not only the amount of rain which falls, but how fast it comes.

On January 8th the Weather Bureau also issued flood warnings for all the interior rivers of Louisiana, with the prediction that the crest of the flood would be reached the latter part of this month. That's nearly three weeks between the day of warning and the date of the highest water.

In fact, Mr. Hayes tells me that in case of floods on the lower Mississippi itself, the Weather Bureau often forecasts the stages of the flood a full month in advance. Yes, sir, and very accurately too.

To anyone who doesn't know how it is done it must seem almost like magic that the weather forecaster can tell a month ahead within an inch or two of just how high a great river will rise. But there is no hokus-pokus about it. Of course, there are years of experience and a lot of good sound judgment that must be used, but the general principle is simple. When water runs down hill, it takes some time to reach the bottom. Accurate measurement of the rain which falls in gauges located throughout the watershed, and reports of gauge readings showing the height of the water in the river at various points along its course furnish the forecaster with the chief data he uses in forecasting floods.

In the upper reaches of our rivers, and in the smaller, swifter streams, he has to rely on the rainfall reports, and he can only forecast a short time ahead. But as the river reaches lower, more level ground the water moves more slowly, and reports of the height of the water at up-river points and in tributary streams wired into the forecast office give notice of how much water may be expected at points down stream. Those reports together with the records of the past performances of the river at those points, enable the forecaster to estimate how much the stream will rise at different places along the lower reaches of its course. So, you understand, flood forecasts are largely a matter of accurate measurements and communication. And our communication is much faster than the movement of water down stream. Especially, is that true of rivers in low country such as those now in flood in the South.

Of course, if the forecaster predicts the crest of a flood within two weeks, and more rain comes, the river may go higher and the highest water come later than was first forecast. Then another thing which throws off a flood forecast, is the breaking of a levee, as has happened in these floods now going on. When one of those banks, built to hold the water back, breaks, wide sweeps of country may be submerged. The water that spreads out over the land may take off enough water to reduce the expected height of the river further down stream.

True, the water which breaks through eventually finds its way back to the river, but it takes its own good time about doing it.

When such a break occurs, maps and knowledge of the lay of the land may enable the forecaster to make a rough estimate of the effect of the break and make allowance for it in his later forecasts. However, nobody knows exactly where the break will come. It may be one place one year and another the next. The flood forecaster certainly has worries, and a lot of things can happen to change the rate of movement of the water.

But even without any breaks in the levees or any unexpected rains, the movement of water down stream is not always the same. A lot depends on the height of the water and other conditions at the mouth of the stream. The water may come down faster than it can empty out. That means that the water coming down stream piles up and rises higher than it would otherwise. In fact, there is one river in Louisiana which runs North sometimes and South at others, largely depending on the height of the water in the river to which it is tributary, or more properly an outlet. In making his forecast, the weather man must take all such conditions into sonsideration.

In spite of the obstacles to precise prediction, however, our forecasters manage to get out flood warnings well ahead of danger, and far enough in advance for all precautions possible to be taken.

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ANNOUNCEMENT: You have just heard another of our Chats with the Weather Man, which Station ------ presents each week in cooperation with the United States Department of Agriculture.

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UNITED STATES DEPARTMENT OF AGRICULTURE
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CHAT WITH THE WEATHER MAN RELEASE Friday, February 5, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: Let's have a chat with the Weather Man. Our old friend, Ob. Server, has been talking with officials of the United States Weather Bureau about some of this unusual weather, we've been having. Now he is ready to tell us about it ---- Well, Mr. Ob. Server? ----

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I venture to say some of us will be talking about this winter's weather for years to come.

Of course, one of the most usual things the weather does is to be unusual. Recently, however, it seems to have been unusually unusual.

Take the weather on January 21, for instance. On that day, climatically speaking, New Yorkers were living in Augusta, Georgia; Chicago was at Vicksburg, Mississippi; Columbus, Ohio, was living in Montgomery, Alabama, and Washington, D. C. was climatically down in Florida and Keokuk, Iowa was at Galveston, Texas. That is those northern cities were getting the temperature usual in those southern places at that time of the year.

And while the entire eastern half of these United States were getting abnormally warm weather, running some twenty degrees warmer than usual, folks in parts of the west were getting weather that was 10 degrees colder than normal for that time of the year. And, you recall, that warm weather in the East and abnormally cold weather in the West was not just for a day or so. The averages for the early winter have been record breakers.

Mr. J. B. Kincer, of the U.S. Weather Bureau who was showing me a few days ago just how unusual that unusual weather has been, seemed considerably worried at that time. Mr. Kincer is chief of the Bureau's division of agricultural meteorology and gets the reports on the effect of weather on the crops. He said we needed cooler weather. He figured that the buds on many fruit trees in the eastern half of the country were coming out too much for safety. He was afraid they might get so far out, they would be killed off by a sudden touch of normally cold weather.

The danger of warm weather to fruit in the East reminded him of the danger from cold weather which the fruit went through in the West earlier in the winter. You may recall, snow fell in orange and lemon groves in California in the middle of December and in the latter part of November. In December, one big lemon grove had five inches of snow.

In connection with the November cold in California, Mr. Kincer pointed out to me a neat piece of work by the Fruit Frost Service of the Bureau. The forecaster sent out by radio warning that within less than 48 hours there would be need for heaters in orchards to protect the fruit from frost and cold damage. When that warning was broadcast, however, the weather was warm and cloudy and many unsuspecting orchard owners did not "listen in". Fearing this might be so the men in the fruit frost service of the Weather Bureau called up the managers of every citrus packing house in central and southern California and gave them personal warning of the coming low temperatures. These managers got busy relaying the warning to their growers, orchard stoves were filled up, and everything prepared for the cold snap. As a result, much fruit was saved, but the damage was heavy where there was little protection. -----

That was practically at the beginning of a winter which has broken records for cold weather in many parts of the West, at the same time it has hung up new records for mildness in the Eastern half of the country.

It is much the same story in regard to snowfall. The East during the first two months of winter has been remarkably free from snow. The grass was still green in southern Michigan past the middle of January. In the California mountains, on the other hand, there was an unusually heavy snow fall of 9 to 12 feet on the ground in the latter part of December. And when farmers in northwestern Iowa were snowbound, those in the southeastern part of the same State were reported as mud-bound.

However, that wide difference between weather in the eastern and western halves of this country is the most usual thing about this weather we have had. As a rule, when the East is cool the West is warm, and when the West is cool the East is warm. When it is abnormal one way in one part of the country, it is abnormal the other way in some other part of the country.

But, as you know from recent experience, you can't even count on that. Last year was exceptionally warm everywhere in the country. No State in the Union had an average temperature below normal in 1931. New Mexico had exactly normal, but every other State averaged above normal.

On the other hand, in 1930, year before last, we had the driest year on record. Last year, however, was outstanding as a year of normal rainfall. Only five states had above normal amount of rain. Most had just about normal; except part of the Southeastern States, Georgia in particular, and , of course, Montana and South Dakota, where the rainfall was the least on record.

Now maybe you are thinking we can count on the years averaging up. On the theory that "all that goes up is bound to come down," you might figure that the warm weather the East has been having will be followed by cold weather. And the unusual cold weather in the West by a warm spell.

But weather forecasting is not such a simple thing as that. The swings of temperature from day to day, week to week, month to month and year to year are so irregular that Mr. Kincer tells me they are of little help in actual forecasting.

For instance, with two months of unusually warm or unusually cold weather, some of us might be tempted to guess that February will be considerably the other way. Mr. Kincer and other Weather Bureau officials have dug up the past

records of such conditions. They say that judging by past records, the changes of this February being warmer or colder than usual seem to be just about 50-50.

You probably have noticed yourself when we have rain one day there is a little more chance there will be rain the next. The weather seems to run in series. Since 1918 we have been having a series of warm years. Yet no one can say just when a series of cold years may set in. Weather is a highly variable proposition, whether you take it by theday, week, month, or year. It is apparently irregular even in its irregularities. If there is any order to such changes it is still undetected and unusable for practical long range forecasting.

The meteorologists of the United States Weather Bureau study all available records for any helps in making forecasts, but as yet accurate weather forecasts must be based on actual weather in sight and are made only some 36 to 48 hours in advance of the arrival of the predicted weather conditions in the territory for which the forecast is made.

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ANNOUNCEMENT: You have just listened to the chat with the Weather Man presented by Station _____ _____in cooperation with the United States Department of Agriculture. We will have another chat on the weather two weeks from today.

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UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN RELEASE Friday, February 19, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: Now let's have our chat with the weather man. The unusually mild winter in the eastern United States still has a lot of folks talking and figuring -- so our old friend, Ob. Server has been asking the meterologists of the United States Weather Bureau about what is behind it ----------
All right, Mr. Ob. Server, what did you find out?

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Well, there has been a lot of speculation about the mild winter, in the eastern half of the United States. As usual in cases of so-called "freak weather", there have been quite a few extraordinary explanations advanced to account for it. --- That is the way with some people, they always try to explain the unusual by something still more unusual, or mysterious, or complicated. Others just accept it as one of those things that "passeth all understanding."

But from what the meterologists of the United States Weather Bureau tell me the causes are reasonably well known to our weather scientists.

In fact, Principal Forecaster C. L. Mitchell says the immediate causes of warm weather or cold weather are exceedingly simple.

It is all a matter of the movement of the air. Whether we have warm weather or cold, depends on where the air is coming from, and, to a considerable extent, on how fast it is coming.

For example, if cold air is coming from the Arctic, and moves down slowly it has a chance to warm up a bit. On the other hand, if it gets down in a hurry it doesn't have a chance to warm up much. The same principle is true in case of warm air. If it comes fast from the south, it doesn't have chance to cool down so much before it gets to us.

Well, that's simple enough. But why does it move fast sometimes and slow at others?

Of course, you know the answer. It is the difference in the pressure. The more difference in the pressure the faster the air moves. The heavy, cold, dense high pressure air usually drifts toward the light, warm, thin low-pressure air. The sharper the differences in pressure, the faster the movement.

If you watch the Daily Weather Map in your paper or posted in some public place, you'll notice how those changes are recorded. Those sweeping curved lines across the face of the map connect the points where the barometers show the pressure to be the same. If those lines are drawn relatively close together, you see there is considerable difference in the pressure, which causes fast movement of air. If the lines are relatively few and far apart, you know the differences are more slight and the air in that region is likely to move more slowly.

Now let's consider this question of winter time weather in the eastern half of the United States. Ordinarily, the cold, heavy air from northern Canada and the Arctic drains down into this country in a southeasterly direction. Whether that cold air movement will reach any given place quickly or slowly, or whether it will ever get there at all, depends on the conditions of pressure between that place and the oncoming cold air. If pressures progressively high toward the source of cold air, conditions are right for that cold wave to come right ahead. But if there is a considerable area over which the pressures are low somewhere on the route between us and that cold air moving toward us, it may block off the cold air movement.

As I gather it, during this unusually mild winter in the eastern half of the United States, the distribution of those high and low pressure areas have been such as to prevent the usual amount of cold air moving down from the Arctic to give us what we think of as our regular variety of winter. From the forecasters standpoint, it just hasn't been on the map for us to get cold weather in the Eastern United States.

But you say, why has the air been unusually stagnant, and why have we not had the usual flow of cold air from the Arctic.

Well, as Dr. W. J. Humphreys, meterological physicist of the Weather Bureau, explains it, it is largely a matter of supply. There is just so much cold air and so much hot air. Air is constantly being cooled in the polar regions, and constantly being heated in the equatorial regions.

It is the interchange of air between those regions that sets up the circulation of winds which so largely make the weather the whole world around.

Well, now, there is just so much air around this globe of ours. The air at the poles is constantly being cooled. That cold air must go somewhere. It must drain down to the lower, warmer latitudes. And of course it goes the easiest way. One of its favorite routes is down the McKenzie Valley through Canada, because from the Arctic to the Gulf along that route there is no high land to stop it. If it hasn't come that route this year to the usual extent, it must have gone somewhere else. And Dr. Humphreys says that is just what it has done. It has spilled over the other side and drifted down into Europe, and made colder weather than usual, there.

It can't go out over western Siberia, for that is high land and cold air doesn't run up hill. In fact, Dr. Humphreys says we may at times get part of our cold from Siberia, as it drains from that higher land into the polar regions and on down to us.

As we pointed out awhile ago, whether the air movement is one way rather than another is due to pressure conditions. Our usual supply of cold air from

the North took another route because pressure conditions were more favorable to such a movement.

And if you have one of those inquiring minds that insists on knowing why the pressure conditions were unusual, I'll have to admit that you are pushing me too far, and right into some complicated questions.

Perhaps we had better not go into those questions right now. But when you get to figuring on reasons for difference in pressure, you find yourself right back to questions of movement of air currents; not only here at the surface, but at many different levels right on up as far as there is any air.

For you know that with our barometers we measure the pressure or weight of a column or cross-section of our atmosphere from top to bottom where we are. Cool, heavy air gives us high pressure measurements. But that measurement is the total for the whole column. The air column that is on the average cool, may represent air of many different temperatures at the different levels. Changes in the air far above where airplanes go may help produce changes in our pressures here below.

What may seem unusual and mysterious in the vagaries of the weather might be plain if we fully knew the intricate interchange between the ever shifting winds which make up the complete air circulation of this old globe of ours.

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ANNOUNCEMENT: You have just heard another of our bi-weekly chats with the weather man, presented through Station ---------- by the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE
Radio Service

OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN

RELEASE Friday, March 4, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: Now for our chat with the weather man. At this time every other week, your old friend Ob. Server brings you the results of his talks with the scientists of the United States Weather Bureau. These are the men who not only talk about the weather, but do something about it --------

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Let's talk about forest fire weather today. Or rather let me tell you what Mr. W. R. Stevens, of the United States Weather Bureau, told me about it.

Of course, you know that weather conditions have a lot to do with whether or not fire is likely to get a start in the woods. And if it does, how far it will burn. Even if you never saw a forest fire, you know that dry litter is in bigger danger from fire than damp litter. And from your own experience, you know what a big difference a change of wind may make in fire fighting.

And remember these forest fires are on a big scale --- sometimes on a tremendous scale -- Why, in northern Idaho last summer one bad fire burned 20,000 acres of timber in one day, and spread over 1600 acres an hour for twelve and a half hours. Well, in case of a fire like that, you can't just run around the other side of the fire in a few seconds when the wind changes. It may take hours of travel over rough forest trails carrying fire fighting tools by mule back to reach the scene of the fire at all. Sometimes hundreds of men must be recruited from distant places, and men and supplies rushed to stretegic points from which to fight the fire. Managing a forest fire fighting force reminds you a lot of shifting soldiers and supplies for a big battle. Naturally, the men in charge of fire fighting need all the advance information they can get in making their plans. They need to know when the danger point is reached, when things get so hot and dry as to make fires likely, so they can get the forces ready to move and get supplies located at convenient points. And when fire actually breaks out, it is highly important to know what weather is coming. A change of temperature or a change in the dryness of the air or a change in the wind may mean destruction or safety for large tracts of timber.

That is the reason for the forest fire weather forecast service which the United States Weather Bureau, in cooperation with the United States Forest Service, forestry organizations, and private corporations, has been organizing and improving since 1925. Fire weather forecasts are now made for forested areas in California, Washington, Oregon, Idaho, Montana, Minnesota, Wisconsin, Michigan, the New England States, and the Adirondack Mountains region in eastern New York.

This summer, Mr. Stevens tells me, service will be started in the southern Appalachians from headquarters to be located at Asheville, North Carolina. Of course, the first season's work will be largely in the nature of a survey for the location of the net-work of observation stations throughout the forested regions. In the eastern part of the country, most of the fires come in the spring and fall, while in the West the worst part of the fire season is in midsummer.

During the fire season, each forest fire forecast center gets reports from its net-work of stations giving the temperature and humidity measurements at various points scattered throughout its territory. From these reports, together with the regular reports from all over the country, which are used to make up the regular daily weather forecast map, the fire weather district forecaster makes his own map and forecast.

The working of the fire weather service varies, however, according to conditions in the various forest districts. In the more thickly populated forests of the East, it is little trouble to get observers any place, but in the West the observations are usually taken at forest lookout stations by the forest lookouts. The fire weather forecasters are men not only trained in meterology but also well grounded in methods of fire fighting in the forests.

In California, the system is a little different from that used in the other fire weather districts. In California, the forecaster has a truck, which is fully equipped as a weather forecast office. Two men, a weather man and a radio man go about from one fire to another in this truck, set up their instruments in the forest, get the measurements of wind and temperature and humidity near the location of the fire itself where they are in close touch with the forces encamped in the forest to fight the fire.

While taking the local measurement of weather conditions, the truck gets the reports from other parts of the country by radio from the Mare Island Naval Station. With this information, the forecaster prepares a regular weather map right there in the truck stopped in the forest. From that map, he quickly makes the forecast to the man directing the fire fighting forces. If a change of direction in the wind is indicated, fire fighters may be sent immediately to the parts of the forest which will be menaced when the change comes.

In valleys and canyons, the wind moves up the valley during the day, and at night reverses and moves down the valley. Just when this change will come depends largely on the steepness of the slope and the width of the valley. The weather man in this case has made a study of such changes on different slopes and can forecast the time the change will come. Knowing the time and the rate at which the fire is advancing, the man directing the fire fighters can better determine where to most effectively attack the fire and where to build back fires to burn a fire-break to check the flames.

The forecaster on the truck is naturally so busy at the fire he is on that he can't look after the forecasting for other fires which may break out in distant parts of the State. In such cases, however, the regular district forecaster makes the forecasts for the other fires, which are sent out by wire in the usual way. If two fires break out at once, the weather office on wheels rushes to the one which seems to be the most menacing. Or in case of two fires of equal importance, the truck riding forecaster is sent to the one which can be reached quickest.

But, as we said before, conditions of the different fire weather districts are different. That applies not only to the ease of recruiting fire fighters and getting them to the scene of action, but also to the nature and cause of the fires themselves. In the Western forests, the fires are more often the spectacular type which get into the tops of the trees and destroy the entire tree. The big problem in the West is to keep the fires on the ground and prevent such crown fires. In the Eastern forests, the fires are more generally the slower moving ground fire type which kills out the young growth.

In the east, the temperature and relative humidity are the things with which the fire weather forecaster is most concerned. In the west, thunderstorms must also be taken into consideration. In Idaho 65 per cent of the fires are started by lightning. In the east, a very small per cent of fires are lightning caused. Railroads are blamed for a number of fires both in east and west. But in all our forests, east and west, one of the big causes of forest fires is the careless smoker and camper.

But that is getting a little off our story. The district fire weather forecaster can't predict when some thoughtless tourist or camper will toss a lighted cigarette butt or a burning match into the litter on the forest floor. But they can and do forecast the weather conditions which make it more likely that a disastrous forest fire will result from such carelessness. In the fire weather service, Mr. Stevens points out, we are developing another important aid in protecting our forests from the increasing menace of fire.

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ANNOUNCEMENT: Two weeks from today we will have another of these chats with the weather man, prepared by the United States Department of Agriculture and presented through Station -------.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

MAR 1 Agriculture

CHATS WITH THE WEATHER MAN Friday, March 18, 1932.

FOR BROADCAST USE ONLY

ANNOUNCEMENT: And now for our chat with the weather man. We read the weather forecast every day. We see and hear the same terms used over and over again. But do we have a clear idea of just what those terms mean? Well?--

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The old song says it is always fair weather when good-fellows get together.

But, of course, the weather man doesn't make his forecasts in any such convivial spirit.

The dictionary defines "fair" as clear and cloudless. On the other hand, some folks regard the weather as "fair" so long as it doesn't rain. They speak of the day being "fair" when the sky is completely overcast with clouds.

Neither of those are exactly the meaning of the word "fair" when it appears in the official government forecast you most often read in the upper corner of your newspaper or hear quoted over the radio.

When the U. S. Weather Bureau's forecast says "fair" it means that no precipitation; that is, no rain, or snow, or sleet, is expected; but the character of the sky may range from clear to partly cloudy.

When no precipitation is expected, and the sky is expected to be free or nearly free from clouds, the forecaster uses the word "clear". When no precipitation is in prospect, but the sky is expected to be overcast with clouds, the forecaster says so. He uses the simple, straight-forward word "cloudy" to define the expected condition.

If he judges that the sky will be overcast, but that there will be occasional breaks which will last considerable time, he uses the words "mostly cloudy."

And when the indications are that there will be no precipitation, but some cloudiness, he phrases his prediction with the term "partly cloudy."

So you see each term in that weather forecast has a very definite meaning all its own. The forecasts have to be short and to the point, and so the same definite word is used regularly to describe the same sort of expected conditions. Of course, there is not much chance for us to go wrong

in interpreting such forecast words as "warmer" or "colder" or "local Thunderstorms" or "fog" or "cold wave" or "light frost" or "heavy frost". They speak a language we all understand.

But Mr. E. B. Calvert, chief of the forecast division of the United States Weather Bureau, tells me that the Weather Bureau often gets inquiries as to the exact meaning of some of these other terms we have been talking about.

We have mentioned "fair" and "clear" and "cloudy" and "mostly cloudy" and "partly cloudy". Then there is the expression "generally fair". The forecaster uses the term "generally fair" usually when he is referring to relatively large areas, such as a whole State, or half a State. When he predicts "generally fair" Mr. Calvert points out, the forecaster has in mind that there will be some variation in cloudiness and possibly some light precipitation in scattered places, but over most of the area the sky will be clear to partly cloudy.

When he predicts "increasing cloudiness" he expects the sky will be clear or partly cloudy at the beginning of the forecast period, becoming overcast by its close; or, the sky will be nearly overcast with thin, high clouds at the beginning of the period and intermediate or low clouds will develop before its close.

Of course, you know our weather forecasts are for definite periods. Those issued in the morning from all the district forecast centers are for 24 hours, divided into two periods of 12 hours each. The first period begins at 8 P.M. Eastern Standard Time, of the day of issue, and the second begins at 8 A.M. and runs to 8 the next night. When the weather man says "tonight" he means from 8 P.M. until 8 o'clock in the morning. And when he says Friday, he refers to the period from 8 in the morning Friday to 8 at night. In local forecasts, you may notice forecasts issued on week-day mornings for "this afternoon". But the weather man's afternoon extends from noon to 8 at night.

The forecasts issued in the evening are for 36 hours, beginning at or just before 8 o'clock the next morning. They are not for as closely-defined periods as those issued in the morning. They refer principally to daytime conditions, except in case where "night" is specifically mentioned.

But to get back to the weather words; "unsettled" doesn't refer to the state of mind of the forecaster. When he says "unsettled" he has a pretty clear idea that there will be considerable cloudiness and threatening weather, with very little, less than two hundredths of an inch of snow, or rain, or none at all.

But maybe we should explain what "threatening" weather is. It certainly isn't clear. To the weather forecaster, "threatening" refers to a sky overcast with dark, lowering clouds, but under such conditions that he does not think it likely that there will be rain or snow, or other precipitation.

The weather men prefer to use that word "precipitation" because it takes in any and all forms of rain, snow, sleet, and the like. When he says

"rain" he means rain that lasts a comparatively long time, not just showers or occasional rain.

Intermittent rainfall of comparatively short duration he refers to as "showers" and rainfall at infrequent intervals but not prolonged he refers to as "occasional rain".

says

So it is with snow. When the forecaster / "snow" he means snowfall that will keep up for some time, not just occasional snow, or snow flurries. If he thinks the prospects are for snowfall at infrequent intervals and not prolonged, he words his forecast "occasional snow" and if he finds the indications are for very light and intermittent snowfall, the term he uses is "snow flurries."

Another thing folks often get mixed up on Mr. Calvert says is "sleet" and "glaze". Sleet is precipitation in the form of small ice pellets produced by the freezing of rain in the free air. Those pellets are dry, you know, and do not cling to anything in falling. "Glaze", on the other hand, is that ice coating formed from rain freezing on objects in a very shallow layer of cold air, the temperature of both the air and the objects being below the freezing point. A deposit of glaze on an extensive scale is called an "ice storm", but that term is not used in forecasts.

"Probably," and "probable" and "possibly" are words you sometimes see or hear in the forecasts of precipitation, but they are not such weazel words as some folks seem to think. "Probably" or "probable" signifies that, in the judgement of the forecaster, precipitation is very likely to occur. "Possibly" indicates uncertainty, but that precipitation is more likely to occur than not.

Another term that sometimes raises questions is the term "Clearing". That term is used by the forecaster when precipitation which will take place in one 12 hour period is expected to end shortly after the beginning of the next forecast period, and to be followed soon thereafter by broken clouds or clear sky.

Speaking of clearing, however, I hope that this helps clear up some of the doubt in some folks minds about the terms used in the daily weather forecast. Anyway look at the forecast in your papers, or listen for the exact wording as given over the radio with this idea of the definite meaning of the terms in your mind. It may make the forecasts more meaningful for you.

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ANNOUNCEMENT: You have just heard a chat with the weather man on weather forecasts and their meaning, as explained by Mr. E. B. Calvert, chief of the forecast division, of the United States Weather Bureau. We will have another of these chats with the weather man two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE Radio Service OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN. RELEASE Friday, April 1, 1932.

FOR BROADCAST USE ONLY.

ANNOUNCEMENT: Now for another chat about the weather. Today we are going to hear what meterologists of the United States Weather Bureau have to say on the old argument between the older inhabitants and some of the younger folks as to whether our climate is changing. Some say it is, and some say it isn't.

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Every time we have unusual weather for a season or two, somebody digs up some old weather record or some grandfather recalls that the weather was very different when he was a boy. -----

But what are the real facts in the matter? Are the old fellows really right about it? Has our climate changed in the past two or three generations? Is it changing now?

What does Dr. O. L. Fassig say about it? You know, Dr. Fassig is the chief of the climatological division of the United States Weather Bureau. That is the division that keeps the records of our climate. What's more, Dr. Fassig himself has just made a study of this very question based on weather records of over 5,000 stations within the United States, or an average of about 100 stations in each State.

From what he has found it seems that some of those "I-remember-when" boys may be right about it. Their memories may not have just played them a trick as some folks think. The weather may be different from what it was when they were young. They may have their weather facts right. -------
-------But wait a moment! Don't jump at the wrong conclusion there. The actual records show some striking things. The climate is changing, but it doesn't keep changing in the same direction. And it may be rainier over a series of years in one state, and drier during that same period in a nearby state. Then may come a series of years when the weather is just the other way. It is the same with hot and cold weather. Dr. Fassig has found that there are periods of several years when it is colder than normal. Others when the weather runs just about average. Others when it is warmer than normal. There is a swing back and forth over a period of years when you consider the weather records in any one state, or in the United States, or if you take in the whole North American continent.

However, Dr. Fassig points out, that the more territory you take in the less noticeable are the variations from the normal. Taken by and large, the climatic changes over one section of country tend to counterbalance changes in the other direction in some other part of the country. Yet even in as vast an area as that of all North America you can still see in the weather records as charted by Dr. Fassig, that such long time swings do occur.

Dr. Fassig made a review of rainfall and temperature conditions over the entire North American continent based on the records extending over fifty years from 1881 to 1931. He wanted as long a period ,as he could get in which the records were comparable for all the localities, and that was as far back as he could go and get such records. Of course, in some parts of the country weather records go further back than that, but to be of much value the records of different localities to be compared have to be for the same period.

Well, Dr. Fassig figured out the average rainfall for each of the states during that fifty year period, as shown by the records from about 100 stations to the state. With that average or normal rainfall of a state as a base line, he then charted the rainfall of the state during the fifty years in reference to that normal or average rainfall. That brought out in a striking way the long up and down swings of the amount of rainfall.

Take Oregon for instance, Oregon shows decidedly more than normal or average rainfall from 1881 to 1905, during the first 25 years of the period covered by the chart, and a steady decrease in rainfall during the past 25 years.

But when the rainfall in Utah is charted for that same 50 year period, what do we find? Just the reverse of what happened in Oregon. In Utah the trend of rainfall was way below normal during the first 25 years, and has been much above normal during the last 25 years.

In Alabama, you see the same general trend. The first half of the fifty years was drier than normal, the last half was wetter than normal.

The chart of Arkansas rainfall, however, shows a different picture. From 1881 to 85, came five years of heavy rainfall. Again from 1925 to 30 the records agains how heavy rainfall; but all the intervening period from 1885 to 1925, the rainfall was below the normal.

Or take the California chart. During the ten years from 1881 to 1900 the rainfall in California was below the average for the fifty year period. Then from 1901 to 1920 it was above average. Then from 1921 to 1930 the rainfall was again below average.

The Michigan station records for that same period make still a different type of chart. Back in the 80's the records reveal a series of heavy rainfall years, while practically the entire period since that time shows up as below the average.

Throughout the section of country including Virginia, Maryland, and Pennsylvania, there has been a remarkably dry period during the past 20 years preceded by a long period of heavy rains.

Similar changes occur in temperature, Dr. Fassig says, and he is now charting the cold and warm periods in much the same striking fashion as he has used to reveal the long up and down swings of wet years and dry years. -------

But hold on a minute --- You are probably thinking, as I was when Dr. Fassig was telling me about these swings, "When does the next swing start?"

Well, we are both doomed to disappointment there. Dr. Fassig says that so far there is no regular periodical swing visible in the records. Whether there is any definite period or regular periodic cycle to these temporary climatic changes is something nobody can say. This regular systematic weather science of ours is young yet. You must remember, Dr. Fassig tried to get as long a period of comparable records for the whole country as he could, and fifty years was as far back as they go.

And remember, too, that when, instead of taking one State, you take the record for the entire United States, you find the differences between the different period are largely ironed out. The ups and downs become shallower and shorter.

That shows up very impressively on the chart for the whole country for 1930. Although there was intense drought in limited areas in the East the rainfall over the other parts of the eastern half of the country was heavy enough to more than offset the dry spots and give the region as a whole a rainfall-record above the average.

Getting back to our original question, then: Has our climate changed? Is it changing?

The answer, seems to be, yes, temporarily. Permanently, No. When we take in a large territory and a long period of time, we find that the temporary changes from warmer to colder or colder to warmer; From wet to dry or the other way around don't last and tend to even up in the long run.

Our climate, the record shows, has not permanently departed from its ways in our youth. But we may be able to rise and say, "I told you so", because the weather is different from that we used to get. The most usual thing the weather does is to change.

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ANNOUNCEMENT: You have just heard a discussion of our changeable climate, presented by Station -----in cooperation with the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE
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CHATS WITH THE WEATHER MAN

RELEASE Friday, April 15, 1932

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FOR BROADCAST USE ONLY

ANNOUNCEMENT: Before we get through, you may feel the salt spray in your face, or hear the rustle of leaves, for we are now going to have a breezy chat with the weather man. We are going to talk about the oldest and most universal way of measuring the wind, and how that system fits in with the terms used in our daily weather forests by the United States Weather Bureau.

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When you read or hear such terms as "moderate" or "fresh" or "strong" in connection with predictions of winds in the weather forecast, do those terms have a definite meaning for you? Just what is the difference between a "light" wind and a "gentle" wind? How can you yourself tell whether the wind blowing outside is "gentle" or "light" or "fresh" or "moderate"?

Naturally, we all have a vague general idea of what we would call "light" wind and what we would refer to as "moderate." But you may be from a windier section of the country than I am. What you would call "light" I might refer to as "moderate". That is, we might differ that way, if we had to rely on our own feeling and judgment in the matter. But weather forecasts are not written in any such loose fashion. Weather words must have a definite meaning. And they must have the same meaning one place as another.

That is certainly true of our wind words. Mr. B. C. Kadel, chief of the instrument division of the United States Weather Bureau, tells me that in the reports of wind force received by the Weather Bureau from ships at sea the Beaufort scale of wind force is used. That "Beaufort Scale" may sound like something highly technical, but it is the system in world-wide use by sea-faring men, and, as Mr. Kadel explains it, is very simple and understandable. And what's more it sounds usable for most any of us.

Of course, you know our Weather Bureau offices in this country are equipped with wind gauges or anemometers with cups that rotate in the wind and measure the force of the wind in miles per hour. These anemometers have errors which only since the development of wind tunnels in connection with aviation have become known at the higher velocities, and furthermore it is difficult to place them where they will experience the full sweep of the wind from all directions. It is hard to use ordinary mechanical anemometers on shipboard, especially when the wind is high and the ship is rolling and pitch-ing and tossing. For that reason, seamen have stuck to the Beaufort scale, which relates to the effects of the wind itself.

Beaufort is the name of the man who worked out the simple system of classifying the winds according to the effects they produce. He was a British

naval officer back in the old sail-ship days. He didn't want to clutter up the ship's log with long-winded descriptions of the wind, so he devised a scale with 12 definite scale numbers running from zero, for calm, to 12 for hurricane.

The number 1, on Admiral Beaufort's original scale, stood for just enough wind to give steerage way to a British man-of-war, of his time.

No. 2, stood for "Light Breeze"; 3 for "Gentle Breeze"; 4 for "Moderate Breeze". Those terms were based on the set of the sails needed in the different strength winds. The light to gentle breeze was enough wind so that a well-build sailing vessel of the man-of-war type with all sails set would go in smooth water. 4 to 5, or "Moderate" to "fresh" breeze was the force of wind most advantageous for sailing with all sails drawing. 6 was "Strong breeze" and 7 "High wind" when it became necessary to reduce the spread of sail. 8 stood for a gale and 9 for a strong gale, when there had to be considerable reduction of sail. 10 and 11 were the numbers used to designate a "whole gale" and a "storm" when only closed reefed sails could be carried. Number 12 was the hurricane in which no sail can stand.

Well, the distinguished Admiral sailed toward the sun-set more than a hundred years ago. Sail ships of the type he knew have practically disappeared from the seas. But seaman under Beaufort, who learned to observe the effect of the wind on the sea and classify the winds accordingly to his scale, passed their lore on to younger sailors. In that way, the system he used has come on down from generation to generation to the present and is used by the many ships which report to the United States Weather Bureau.

Of course, on land we can't use the white-caps on the waves or other such wind effects as a guide in classing the winds, so specifications have been worked out for the benefit of us landlubbers on that same scale.

When smoke rises vertically, we see readily that it is calm. That is much the same condition old Admiral Beaufort found at sea when there wasn't enough wind for him to steer his sail ship.

The No. 1 on his scale corresponds to the strength of wind when we can tell the direction of the wind by the drift of smoke, but when there is not enough wind to move the ordinary wind vane. That is wind blowing about 1 to 3 miles an hour, as measured on the anemometer. A No. 2 wind on the Beaufort scale is the strength wind you get when there is just about enough wind for you to feel it on your face, and to make the leaves rustle, and to move the ordinary wind vane. That takes a wind of from 4 to 7 miles an hour. A wind like that, or anything less than that, is a "light" wind. When the daily weather forecast mentions light wind that is the force of wind you may expect.

If the forecast uses the term "gentle" winds, it refers to winds of from 8 to 12 miles an hour. When the leaves and small twigs on the trees are in constant motion or when there is enough wind to extend a light flag you have one of those gentle winds, which corresponds to No. 3 wind on the Beaufort scale.

And here is the way you tell a "moderate" wind of 13 to 18 miles an hour, corresponding to old Admiral Beaufort's No. 4. When the wind raises dust and loose paper and is strong enough to move small branches on the trees, you can classify that wind as "moderate" for that is the force of wind, the

forecaster means when he says "moderate."

When the wind gets up to 19 to 24 miles an hour, the wind not only moves the small branches, but small trees that are in leaf will begin to sway. If you are where you can look at a river, or lake or pond, you will notice that on such inland waters, a wind of that strength will cause crested wavelets to form on the water. The forecaster calls that a "fresh" wind, corresponding to Beaufort's number 5.

The next step up in the forecaster's wind vocabulary is "strong". When the wind gets up to 25 to 31 miles an hour, it is classed as No. 6 on the Beaufort scale. A wind like that puts big branches on the trees in motion, and you hear it whistling through the telegraph wires, and umbrellas are hard to handle. When the wind gets up to No. 7, from 32 to 38 miles an hour, whole trees are in motion, and you find it hard to walk against the wind. Both 6 and 7 are included in what the forecaster calls "strong".

When the wind gets stronger than that, say when it breaks twigs off trees, and generally impedes progress, or up to where it knocks chimney pots off houses or strips slate off roofs, or does other slight damage to buildings, you have a "gale". A gale takes in Beaufort scale numbers 8 and 9, that is from 39 to 46 and 47 to 54 miles an hour.

That's about as high wind as we usually get inland; so "light", "gentle", "moderate", "fresh", "strong", and "gale" are the forecast wind terms we are most likely to see.

A No. 10 wind, of 55 to 65 miles an hour in which trees are uprooted, and considerable damage is done to buildings seldom happens inland. And a No. 11, from 64 to 75 miles an hour, which does widespread damage, very rarely happens. When such rare damaging winds as those two classes are expected, the forecasters have a word for them. "Whole gale" is the term used.

Of course, when the wind gets up above 75 miles an hour it is a "hurricane". When the wind gets to No. 12 or to hurricane force, most of us would probably describe it just about as General Sherman did war.

It is interesting, however, to observe the effects of our ordinary winds, and to try to calssify them as "light", "gentle", "moderate", "fresh", or "strong", as the case may be, and to check up on these wind words in our daily weather forecasts.

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ANNOUNCEMENT: You have just heard a chat with the weather man. This talk has come to you as a presentation of the United States Weather Bureau of the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN

RELEASE Friday, April 29, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: The weather man, you know, draws pictures of the weather. In our chat with one of the meterologists of the United States Weather Bureau today, he gives us a little lesson on the appreciation of that meterological art on which forecasting is based.

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How does the forecaster do it? Some folks seem to think the forecaster uses some mysterious hidden method to predict the weather.

He makes his forecast. That forecast of coming weather is broadcast and telegraphed over the country. Practically at the same time, a complete picture of the main facts on which the forecast was made is mailed out from each district forecast center.

I refer to that daily weather map you see posted up in the post office and other public places. That map, with its circling lines around centers marked "High" and "Low" shows in graphic form the state of the weather at the time observations were taken at the many different stations scattered throughout the country. There on that map you have the salient features on which the forecast was based.

Mr. Welby R. Stevens, of the forecast division of the United States Weather Bureau, points out that the ceaseless changes in our weather are due almost entirely to the comings and goings of those "Highs" and "Lows" and the winds that go with them.

The "Low" on the map marks the center of a low pressure area of depression or disturbance, as the meterologists speak of it. As you will notice, on any daily weather map you may see in a public place or on the smaller maps published in the newspapers of some cities, a "Low" takes in a lot of territory. On the average, the "Low" is between 600 and 1000 miles across. Sometimes, however, you will see a "low" as much as 2000 miles in diameter. Usually a "low" will move from some westerly to some easterly point.

However, you will notice from those little arrows on the weather map, that the wind does not blow from the same direction that the "low" is moving, except in a certain part of the disturbance. As you see from those arrows, the winds circulate around the "LOW" in the reverse direction to that of the hands of a clock.

The temperature to the south and east of a "LOW" on our map is com-

paratively high, Mr. Stevens says because in these parts of the LOW the wind is coming from some southerly quarter. On the west side of the LOW, on the other hand, the air is comparatively cold because the wind is from some northerly direction.

Associated with LOWS we usually get rain, Mr. Stevens points out. Most of the rain is usually in the eastern half of the LOW, however. Clouds are almost entirely lacking on the west side of a LOW.

You will notice that between two LOWS there is always a HIGH. In fact, as Mr. Stevens remarks, you could no more have two LOWS without an intervening HIGH than you could have two valleys without an intervening hill or other rise of ground.

The HIGH or high pressure area is almost the direct opposite of the LOW. Whereas with a LOW comes rain, we generally associate the HIGH with fair weather.

And you will notice that in a HIGH the winds circulate in the opposite direction from the way they move in the LOW. As a HIGH advances, there is a decided drop in the temperature in the eastern part of it where the winds are from the north. After the center of a HIGH has passed, there is a decided rise in temperature on the western side of it, where the winds are from the southerly direction.

There you have the general characteristics of those HIGHS and LOWS on the weather map. Of course, you know how our meterological map artists find out where to put those HIGHS and LOWS. From its stations throughout the country the Weather Bureau gets the barometer readings. The reading for each station is entered on the map in its proper location. Those lines, called isobars, are then drawn through the places that have the same barometric pressure. For example, the line marked 30 passes through points where the barometer readings are all reported to be 30 inches.

All right, on one side of that line, the readings are higher than 30 inches. For each one tenth of an inch increase, another line is drawn until a crest or center is located and marked HIGH. On the other side, the pressures are less than 30 inches and are drawn for each one tenth of an inch decrease until the center is located and marked LOW.

The weather map makers work fast. The reports flashed in by wire and quickly entered and the lines drawn to give the picture of current weather conditions. We call that the daily weather map, because it is issued every week day, but it is really a snap-shot of the weather the country over at the time the observations were taken. Those HIGHS and LOWS are moving. The chief job of the forecaster is to interpret just how that ever-shifting traffic of HIGHS and LOWS will move.

To get a motion-picture of our national weather, we compare the maps from one day to the next and see how those HIGHS and LOWS change their positions.

From such comparisons, it is clear that the great majority of LOWS that originate in or pass over the United States move out to sea near Newfoundland.

LOWS may develop anywhere, but certain parts of the country seem more favorable to their development than others. For example, many originate over Colorado, Texas, the Gulf of Mexico and the Southeastern States. A forecaster, Mr. Stevens tells me, watches those regions very carefully for the first indications that a storm is brewing.

Once a LOW forms it doesn't move along its path at the same rate from day to day or season to season. A LOW moves fastest in winter and slowest in summer, and makes on the average about 600 miles a day. It moves faster in the Northern States than in the Southern.

HIGHS usually move into this country either from the Pacific Ocean or from Canada. They advance eastward and southward until they get to the Atlantic states and then either turn toward the northeast or move on toward Bermuda. Most of the HIGHS which come from Canada form in the Mackenzie River Basin or farther north over the Arctic Ocean, those are the ones that usually bring our cold waves.

That in a very rough general way is how HIGHS and LOWS move. If all HIGHS and LOWS acted that way, Mr. Stevens says, forecasting would be comparatively simple. And if you think there is anything simple about it, just try it. As I said before, on that daily weather map you have the chief data on which the regular forecaster bases his forecast.

The trouble in the forecasting business is that so many HIGHS and LOWS don't follow the general run of them either in speed of movement or direction. And the weather conditions that attend them are often not what you might expect from what happens most of the time. In every case, the forecaster has to decide from the evidence at hand and his own long experience in reading weather maps, whether the HIGH or LOW is going to behave in a normal way.

In this shifting of HIGH and LOW pressure areas, the traffic sometimes gets blocked. In fact, Mr. Stevens says that nearly every weather map presents a variety of new problems the forecaster must solve.

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ANNOUNCEMENT: This discussion of some of the main features of the daily weather map has come to you as a presentation of Station _____ and the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN. RELEASE Friday, May 13, 1932

FOR BROADCAST USE ONLY.

ANNOUNCEMENT: Every other Friday, our old friend Ob. Server, brings us the results of his chats with specialists of the United States Weather Bureau. Today he tells us about the possibilities of weather maps for all the northern half of the world, including all North America, Europe, Asia, and the seas that lie between-- ------Well, Mr. Ob. Server?---------

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You radio listeners may hear a good bit about radio before we get through. I gather from what Mr. E. B. Calvert, chief of the forecast division of the United States Weather Bureau tells me, that advances in practical weather science have been largely a matter of speedy communication.

We have been so used to reading and relying on weather forecasts for lo these many years that we hardly realize that real practical weather forecasting is still considerable of a youngster. It has grown as means of communication have been developed. In fact, Mr. Calvert credits Morse and Marconi with being the two men who have done most to make possible the development of weather science.

It practically began with Morse's invention of the electric telegraph, but it was not until Marconi came along with the radio that the weather forecaster was able to get word from vast gaps and blind spots not reachable by land-line telegraph.

Of course, folks have probably been trying to figure the ways of the weather since there were any folks, but for thousands of years they apparently didn't make much headway.

The Greek philosopher, Aristotle, Mr. Calvert says, is generally considered as the father of weather science. He wrote a treatise on the subject, but having no way of measuring the pressure of the atmosphere or the temperature, or of getting word promptly of what the weather was in otherplaces, he couldn't really do much about it. Nobody else being any better informed, Aristotle remained a weather authority for 2,000 years.

But even when Toricelli invented the barometer, less than three hundred years ago, progress in weather science was still slight. One hundred and fifty years ago, when George Washington, and Thomas Jefferson, and Benjamin Franklin had thermometers and a keen interest in reading them, advance in weather knowledge rode a slow coach.

Practical weather science, as we know it, is based on the idea of getting a picture of the weather made up of accurate measurements of temperatures, pressures and air movement from a number of stations, taken at the same time, over a wide area. From that picture or map of the weather as is, the long-experienced forecaster estimates what the weather will probably be at different points on the map. For any such estimate to be of practical value, the records from the different stations must literally beat the wind to the mapping and forecast office.

If electric communications over wires and through the ether had not been invented, Mr. Calvert says, meteorological service today would not have its high place among the necessary and valuable economic organizations of this and other countries of the world. He doubts if there is any other science so vitally dependent on wire and radio communication.

Weather maps were first made and used for weather forecasting in this country in 1868. The great weather scientists, Abbe, through the Cincinnati Chamber of Commerce, induced the Western Union Telegraph Company to provide daily weather reports from places along its lines. Telegraph operators served as observers. At that time, the company had a number of offices in the northern and southern states east of the Mississippi, and their wires had been extended westward nearly to the Rocky Mountains. The Signal Corps of the U.S. Army was pushing its military lines far into the southwest and the northwest, but very few reports were available west of the Mississippi.

Well, for many years after the weather service of the United States was established, the range of the electric telegraph was the area covered by the weather maps used for forecasting. Even back in those early days of weather forecasting, our meteorologists began to reach out for wider and wider knowledge of circulation of air around this top half of the globe. They even made up weather maps of the northern hemisphere from reports of land stations in this and other countries. Those maps were just for scientific study. They were made up from reports sent in by mail, and were issued just one year late.

Weather maps one year behind time were not much practical use. Maps made up from current observations sent by telegraph and cable could not be complete. In the first place, as Mr. Calvert points out, barren wastes and frozen regions where telegraph lines have never been run and where such lines probably never would be run are just as important from the weather viewpoint as the fertile, populated regions of the earth.

In the second place, nearly two thirds of the northern hemisphere is water. Oceans have as much and as many kinds of weather as land areas. Wire lines cannot be built over the oceans so as to contact ships. A northern hemisphere chart without weather reports from vessels plying the vast water expanses would be wholly inadequate. So if we had to rely on telegraph lines and cables, our forecasters couldn't have a complete

picture of the weather in the northern hemisphere.

Opportunity for weather maps of land and sea was born when Marconi invented the wireless telegraph. The U.S. Weather Bureau got its first weather report from a ship at sea by radio in the Atlantic in 1905 and the first from a ship in the Pacific in 1907. In 1906 the Weather Bureau got 758 radio ship reports. In 1922, the number was about 15,000 and last year the number of weather reports received from ships at sea by radio was about 70,000.

With the aid of ship reports and the exchange of land reports with other nations, the United States Weather Bureau now makes up a weather map of the entire northern hemisphere for office use, and could easily publish that daily weather map giving a comprehensive picture of current weather conditions for the use of many people interested, should economic conditions improve.

A hundred reports are sent in every day to the Weather Bureau headquarters by land line telegraph from stations in the United States, At Toronto, telegraphic contact is made and reports from 43 Canadian stations are received. Many of those Canadian reports, Mr. Calvert tells me, are collected by radio. Through the U.S. Signal Corps radio system, 15 weather stations in Alaska forward their daily reports, while 5 stations in Greenland relay their reports to Toronto by radio, from where they are sent by land line to Washington. All are used to make up the northern hemisphere map.

The Weather Bureau gets reports from 26 stations in the West Indies by means of cable and Navy radio, while 20 stations in Mexico forward reports by cable to New Orleans and from there to Washington by land line. From Central America the reports of 8 stations come by radio and land line. So much for our own Continent.

From 90 stations scattered through Europe, Asia, western Russia and Siberia reports are collected and forwarded to this country in a radio bulletin from the powerful English radio station at Rugby, England. In like manner by means of the Navy radio from the Manila Observatory and by radio from the U.S. Ship Houston, in the China Sea we get 90 station reports from points in China, Japan, and Eastern Asia. In addition to these daily reports from land stations, we get 200 more from ships at sea. All these reports are entered in the northern hemisphere map.

These reports coming in each day give us a fairly complete map of the weather a few hours after observations have been made "from Greenland's icy mountains to India's coral strand".

ANNOUNCEMENT: You have just listened to an account of the northern hemisphere weather map now a practical reality by means of radio. This program has come to you as a presentation of the United States Department of Agriculture and Station ----------.

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CHATS WITH THE WEATHER MAN

RELEASE Friday, May 27, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: Now for our chat with the weather man. Today we have a cool, refreshing talk from one of the specialists of the United States Weather Bureau. Around this time of the year it is no surprise to some of us to hear that even Greenland's icy mountains have begun to melt. -----

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Yes, sir, Dr. W. J. Humphreys, in charge of the division of meterological physics of the United States Weather Bureau, declares that Greenland's ice is now melting.

That is, the heat this old earth of ours is getting from the sun is enough to melt during the summer time more ice than accumulates in the form of snow during the winter.

What of it? -- What difference will it make, if it does all melt?

Well, as Dr. Humphreys points out, recent measurements of the thickness of Greenland's ice by the echo method used to determine the depths of the seas show that the ice there is a mile and a half thick in places. When you realize that most of Greenland is covered with ice and Greenland is eighteen times as big as the state of Pennsylvania, you begin to grasp the fact that there is a lot of ice up there.

But that isn't all. As Greenland's ice goes, so will, not only other Arctic ice, but also Antarctic ice. Antarctica is as big as the whole of the United States and probably has a lot of that mile and a half thick ice, too.

Figuring on the basis of the recent measurements, Dr. Humphreys roughly calculates that all in all there is enough ice at the two ends of our earth to make four million cubic miles of water. Of course, that water would go into the oceans. The area of all the oceans is about 140,000,000 square miles. If you add four million cubic miles of water to our oceans, Dr. Humphreys figures you raise the level of the water 151 feet.

Just imagine the water 150 feet higher. That would drown out the world's seaports and far into the back country in many cases. Some of our coast cities would only have the tops of high buildings left to mark where they once were.

However, Dr. Humphreys says we need not get excited about it. It is not going to happen in any of our life time. Even granting that we have our

figures right, the level of the oceans is not coming up suddenly in one big overwhelming flood. According to his figures, the level of the ocean is rising about an eighth of an inch a year.

That is, granting that the ice is now melting at much the same rate it did before, back 30,000 years ago, when the geologists tell us glacial ice was down into what is now New York and southern Ohio, and Illinois. There were vast thick sheets of ice covering much of Europe even 20,000 years ago. In fact, it was only some 9,000 years ago, Dr. Humphreys says, that the melting ice sheet left the city of Stockholm. That has been rather accurately determined by the annual layers of sediment deposited in lakes and elsewhere, recently examined and counted.

According to the best figures now available, then, the ocean level may be rising about an eighth of an inch a year from the effect of melting ice in the Arctic and Antarctic.

But what are the real facts of the matter. Dr. Humphrey has no doubt that more ice is being melted than is being formed. He holds that the water level in our oceans is actually on the increase, but, at present we have no measurements by which to tell just how much it is coming up.

Yet, he says, we could now measure those changes accurately, and find out the true changes in the levels of our oceans. There are some ocean gauges here and there, but no measurements of the ocean levels have been carried out with the degree of accuracy which would be necessary to get these cold water facts.

He suggests, however, that by the establishment of sea level gauges located in widely separated places, especially on islands such as the island of St. Helena, we could now get the facts as to how fast the water in the ocean is rising.

He would be careful not to locate any of those sea-level gauges on volcanic islands, which have a way sometimes of rising or sinking in a most disconcerting manner. And there is always that problem of our more stable land moving up and down in reference to the water. Dr. Humphreys would get around the effects of any such land-movement by locating the sea-level gauges in a number of widely separated places. All the coasts would not be rising or falling at the same time.

By taking these sea-level measurements continuously year after year, a record would be obtained from which it would be possible to tell just how fast this slow flood of water is rising, and just how fast those mountains of ice are melting.

As you know, the U. S. Weather Bureau measures the height of water in our rivers. Those measurements in feet and fractions of a foot give data used in practical forecasts of floods along our rivers.

However, this proposal of Dr. Humphrey's for a gauging of a flood in the ocean is something new. Such measurements, would be made in small fractions of an inch, and would be chiefly valuable in giving scientists a more exact idea of just what is going on at the ends of the earth.

Of course, at the rate Dr. Humphreys figures the melting is now taking place it would take nearly one hundred years for this ocean flood to raise the level of the water one foot. Yet even that much of a change might have considerable practical significance in some of our ports.

However, one of the most striking things about this proposal is the fact that our scientists can now measure such changes with the degree of accuracy which would be needed. Another thing is that international cooperation in weather science has reached the point where the location of the many gauging stations in wide-separated parts of the world appears to be entirely feasible.

Dr. Humphreys admits that there is a possibility that the flood may never rise the full 150 feet he has calculated, even in the hundreds and thousands of years which it might take to melt what ice we now have. There may not be as much ice left as he has figured. However, whether our present knowledge of the amount of ice on hand is accurate or not, if on the average more ice melts than accumulates in the form of snow in the winter, then the difference must be pouring into our oceans in the form of ice water.

"Greenland's icy mountains" may be helping submerge "India's coral strand."

Presumably, as that melting goes forward, the ice will melt faster and faster. But Dr. Humphreys didn't go into that phase of the matter. And no matter how much hotter this ending of the late Ice Age may make things for our remote descendants, all that melting ice and ice water is a cooling subject for a chat with the weather man on a summer's day.

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ANNOUNCEMENT: We will have another chat with the weather man two-weeks from today. These talks on weather topics come to you through the cooperation of Station _____ and the United States Department of Agriculture.

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CHATS WITH THE WEATHER MAN Friday, June 10, 1932

FOR BROADCAST USE ONLY

Speaking Time: 8 Minutes.

ANNOUNCEMENT: Now for another of those chats with the weather man of the United States Weather Bureau. As the poet says, "What is so rare as a day in June. Then, if ever, come perfect days." However, with some of us, it is always too hot, or too cold, or too wet, or too dry ----------

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Dr. W. J. Humphreys, chief of the division of meterological physics of the United States Weather Bureau, says a lot of folks are like that. In January and February, they long for the good old summer time. Then when July and August come, their love of summer wilts with their collars, and they are not so hot for hot weather. Even June, you will probably admit, has its off days.

In our chilly, pessimistic moments we are apt to look back with regret toward the times in the dim and distant past when this old earth of ours had a decidedly different climate.

For instance, what a glorious world this must have been when the temperature in the Arctic regions was mild and, as the geologists tell us, semi-tropic plants grew in Greenland, and in Labrador, and in Iceland, and on what are now the ice-covered wastes of the Antarctic!

But Dr. Himphreys says that weather wasn't so nice then after all.

Even on a hot summer day, few of us would long for a very long spell of such climate as that back in the ice ages when, the evidence shows, great sheets of ice covered most of North America down to central Pennsylvania, the lower parts of what we now call Ohio, Indiana, Illinois, Iowa, and all the Rocky mountains; while in Europe the ice covered all Scotland and the Scandinavian Penninsula and even stretched as far south as the Alps.

Well, that was too much ice. The very thought of it is almost enough to make you shiver.

Paradoxical as it may sound, Dr. Humphreys says the weather in this

old world was not nearly as bad at that time as you might think. Then those conditions actually existed, thousands upon thousands of years ago, there was too much ice in what is now the United States and Europe.

But that icy covering of northern Europe and America had its compensations. The desert "flourished and blossomed as the rose." Places in northern Africa, in Arabia, and in our own Southwest that are now deserts were well watered, well-covered with vegetation, and filled with an abundance of animal life.

As for the tropical regions, Dr. Humphreys figures that they were not much cooler than now, while the semi-tropical and desert regions were much more fruitful than at present. It was only the higher latitudes that were uninhabitable.

But while the return of such an ice age would have its advantages for some of the less favored spots of the world today, so much ice would be disastrous to the regions where human civilization is now most productive and flourishes best. There would be too mich ice even for those who get heated up over mid-summer weather.

On the other hand, how about the time when the now ice encrusted ends of our earth were free from ice? What would things be like if we were back in one of those periods when Arctic and Antarctic regions enjoyed a moderate to warm climate? According to the geologists, you know, our world has gone through several long periods or ice ages during which for thousands of years our land was largely ice covered. Then the ice would melt back nearer and nearer the poles until it was all gone.

In fact, I gather from what Dr. Humphrey says that we are just now approaching the end of the most recent ice age, which was in full swing ten or twenty or thirty thousand years ago. Our polar ice is melting faster than it is being formed. That is, the heat we get from the sun in summer melts more ice than is formed by the snows of winter.

All right, suppose we had already reached another of those iceless ages when the top of our world was covered with luxuriant vegetation. Dr. Humphrey says that total absence of ice would be far worse than another ice age.

In the first place, there would be less contrast between the equatorial regions and the poles. It is that contrast between the heat of the tropics and the cold air of the poles that gives us our present vigorous circulation of air. If the difference in temperature was much less than it is, the winds would be lighter, and storms less frequent and less violent, rains would be relatively sparse, and clouds would be few, and temperatures would be high.

That doesn't sound like such a bad world to live in does it? But wait a minute, until Dr. Humphreys gets through telling us about this world <u>without</u> Arctic or Antarctic ice.

All the middle part of the world, the tropical regions, he says, would still have rains of the thunderstorm type such as they now have, but there would be fewer of them.—Now I can hear some of my friends from the

tropics say that wouldn't be so bad either.

The higher latitudes, say from about 60 degrees on North, would have fog and drizzle.

From southern Florida to northern Newfoundland, from Morocco to England, all the continent of Asia, China, Japan, and all of southern Africa, and New Zealand, all the world now wealthiest and most abundantly inhabited, Dr. Humphreys says, would be semi-arid to desert. The North and South pole might be clothed in luxuriant vegetation and might enjoy a mild climate, but the part of the world we think of as "our world" would be pretty thoroughly baked.

The climate in an iceless age would be much worse than anything we now know, even in the middle of a hot Fourth of July. And another ice age climate would be only a little less tolerable.

So you see, no matter what you may think of the weather, this world that we are living in is mighty hard to beat.

As Dr. Humphreys points out, from the standpoint of plant and animal life, and us human beings, the best age of all ages, climatically speaking, is an age like the present. That is, an age when there is enough ice to cause a good vigorous circulation of air and plenty of rainfall, but not too much.

So no matter whether it blows hot or cold, or just doesn't blow, remember it <u>has</u> been worse, much worse, several times in the history of this old world of ours. We seem to have landed on this best world we know at the best possible time.

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<u>ANNOUNCEMENT:</u> We will have another chat with the weather man two weeks from today. These talks are brought to you by Station _____ _____ in cooperation with the United States Department of Agriculture.

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CHAT WITH THE WEATHER MAN

Friday, June 24, 1932

FOR BROADCAST USE ONLY

ANNOUNCEMENT: Now for our usual chat with the weather man. Every two weeks, specialists of the United States Weather Bureau tell us things about our always-important and ever-changing weather. At this time of the year, we generally find the shade, as we listen to a calm discussion of a hot topic.

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Speaking of a cool subject for a hot day, how about hail?

Hail used to be considerable of a puzzle to me. A sudden shower of ice pelting right down on a piping hot summer day seemed hard to believe, even when I saw it and felt its sting.

Of course, I understand now that the hot air plays a big part in a hail storm. And by "hot air" I don't mean any of the tall stories sometimes set in circulation after the storm has passed. I refer to the actual heated air.

As Mr. J. B. Kincer, of the United States Weather Bureau explains it, what happens is much like the heat from a fire going up a chimney. There is a strong up draught of warm air from the surface, such as goes with a thunderstorm. And you may have noticed, a hail storm usually comes with a thunder-storm.

Well, according to Mr. Kincer, the big up draught of warm air catches up rain-drops and carries them far up into the colder air, into air cold enough to freeze those drops of water into pellets of ice. Those balls of ice start falling toward the ground.

But that doesn't tell the whole story. If that was the case, a hail stone would always be smooth, clear ice frozen in one piece. But if you have ever taken the trouble to cut through any hail stones or to examine any broken ones you may have noticed that the hail-stone is often made up of a number of concentric layers of ice. Sometimes there will be a layer of hard, clear ice and then a layer of snowy ice, and so on.

As Mr. Kincer points out, those distinct layers mark the ups and downs in the brief life of the hail stone before it came pelting down on your head or bounced harmlessly at your feet. In other words, the tiny frozen rain drop may have started down. It reached warmer air and more water or snow collected around the ice. It may have again been caught up by the rising air current and returned swiftly to the freezing heights. In fact, in some hail stones you examine you may find that there have been several such up and down excursions.

Finally, of course, the hail stone gets too heavy or is thrown outside the strong upward air current and comes diving down to earth.

That idea of the hot air current rising like fire in a chimney is not bad, because that strong draft of warm air is usually very narrow. It covers very little country at a time. In fact, Mr. Kincer says that he has known of a number of instances where there was a severe hail storm on one farm while the farm next to it was untouched by the ice.

As you may recall, Mr. Kincer is in charge of the Weather Bureau division of agricultural meterology. Keeping track of the weather on farms throughout the country is his job, so hail is one of his worries.

Although hail storms usually cover a very limited territory and frequently last only a few minutes, they can do a lot of damage in a short time. Those showers of bullets of ice beating down on growing crops are a serious matter to the man on whose place they fall. And when you figure all the hail storms here, there, and yonder during the whole summer, the damage mounts to a considerable total.

For instance, just take the damage to the corn crop over the country. Mr. Kincer estimates that in a severe hail-storm year, the total corn damage amounted to a loss of 34,000,000 bushels of corn. That is just one crop mind you. Wheat is another. Mr. Kincer says that hail damage to wheat in one season has been known to amount to 17,000,000 bushels.

Of course, the damage the hail does depends a lot on just when it strikes the crop. Often, however, it comes just before wheat harvest. The shower of ice shatters the wheat heads and beats out the grain. In the case of corn, the worst time for a hail storm seems to be the time from tasseling until the kernels form. The hail stones tear the corn leaf blades, and strip and break the plants, and so cut down the yield from those plants.

Mr. Kincer points out that hail storms are very erratic, irregular kinds of storms. And that is true not only of the individual storm, but of the way the storms are scattered around the country one year with the next. Some years most of the hail seems to be bunched in a few states. Other years these local hot-weather ice showers are rather evenly distributed over the map.

This hail authority says his records show that the biggest number of hail storms have occurred in the upper Mississippi Valley and the Great Plains States. But as we have said, the numbers vary very very much from year to year. Ordinarily, there are very few hail storms in the Gulf Coast country, and there are practically none ever experienced on the Pacific Coast.

Speaking of hail storms, however, we couldn't pass up the subject without a word about the size of hail stones. There have been a good many stories about big hail stones. And you can hardly blame a man, when good sized hail stones get to bouncing off him, if he happens to judge the size of a hail stone by the way it feels, rather than by any actual measurement. The evidence is so soon gone that there is seldom much checking up on the estimates.

You have probably heard of hail stones as big as hens' eggs or even as big as base-balls. If you haven't witnessed those chunks of ice yourself, you have probably been a bit skeptical, and maybe you have been right. Yet Mr. Kincer's records show well-authenticated instances of hail stones as big as grape

fruit.

Yes, sir, in a hail storm that struck Potter, Nebraska, four years ago, one of the biggest stones was picked up, weighed, and measured, and the measurements sworn to. That ball of ice with several distinct layers weighed a pound and a half and measured 17 inches around. --- Just imagine having a ball of ice that size hurled at you from the clouds! It is no wonder, windows are sometimes broken and livestock killed by hail-storms.

Some people in Dallas, Texas, still remember the hail-storm of six years ago, when scores of them were reported injured by the falling ice. Mr. Kincer says that some of those hail stones weighed as much as twenty-two ounces. Many of them were reported to be from two to four inches in diameter. But even the stories of those extra big hail stones can't make hail stones as big as marbles or as big as peas melt into insignificance, for the man caught out in the storm.

Of course, storms that are so very local and so extremely erratic as hail storms can't be forecast, Mr. Kincer tells me, but that doesn't prevent the Weather Bureau from collecting all the information it can get on the subject.

And, our agricultural meterologist says, that information is put to good practical use. By charting the number of hailstorms which happen in the various parts of the country, the Weather Bureau gives farmers and insurance companies a fair basis for estimating the cost of the risk of hail insurance in the different regions.

So you see, the United States Weather Bureau has succeeded in getting some good out of a hail-storm besides that little temporary relief from the heat that often comes with the shower of ice.

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ANNOUNCEMENT: You have just listened to a discussion of hail-storms by Mr. J. B. Kincer, in charge of the division of agricultural meteorology of the United States Weather Bureau, as reported this Station _____. We will have another of these chats with the Weather Man two weeks from today.

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CHATS WITH THE WEATHER MAN; RELEASE Friday, July 8, 1932

For Broadcast Use Only.

Speaking Time: 10 Minutes

ANNOUNCEMENT: And now for our chat with the weather man. The experts of the United States Weather Bureau have been telling our old friend, Ob. Server, how folks act where the weather sometimes rises to be a much livelier topic than ordinary.

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Mr. I. R. Tannehill, of the Weather Bureau, tells me than when a hurricane is coming toward our Southeastern and Gulf coasts the crowds around Weather Bureau offices and bulletin boards look like those during the World Series base-ball games, or the crowds getting the returns from a hotly-contested election.

Folks literally come to the Weather Bureau offices in the threatened area by thousands, Mr. Tannehill says, and the telephone calls run to a hundred thousand and oftentimes more. Many people keep maps on which they chart the path of storm as it comes on. As the hurricane gets nearer and nearer, the crowds about the bulletin boards get bigger and bigger.

Railroad and steamship and other business interests keep men at the Weather Bureau offices to keep them advised as to the progress and path of the on-coming hurricane.

You see, hurricanes are big, slow-moving storms. That fact, coupled with the fact that the Weather Bureau gets reports by radio from vessels at sea and from a number of stations scattered through the West Indies, makes it possible for the forecasters to issue warnings from two to ten days before the hurricane hits our coast. Thousands of lives and millions of dollars worth of property have been saved by those warnings. In fact, Mr. Tannehill says, the loss is how often greater at interior points than on the coast, because the people in the more exposed places have become hurricane-wise.

Knowing the hurricane is coming for days ahead, folks along the coast generally have plenty of time to get themselves and their goods and chattels to places of safety. Even when a hurricane appears suddenly and moves unusually fast for a hurricane, there are hours after the warning is received to protect property and seek a place of safety.

From Cape Hatteras along the South Atlantic and Gulf Coasts to Brownsville, Texas, the Weather Bureau maintains more than one hundred display stations. Those stations display regular storm warnings, as well as the com-

paratively rare hurricane signals. Two red flags with black centers flown one above the other is the hurricane signal by day, and three lanterns, one white between two red, hungone above the other, is the hurricane signal by night.

Mr. Tannehill was telling me of a little summer colony community of ninety frail frame houses in an exposed locality, which found itself in the path of a hurricane on comparatively short notice. As soon as he got the notice, the displayman stationed nearby raised the hurricane flag-signal over his motor-cycle and did a Paul Revere to that Colony.

The people in those frail houses responded promptly. They realized that under such circumstances the correct form of hurricane etiquette was expressed by Lady Macbeth, when she said, "Stand not upon the order of your going, but go at once." Eighty-eight of those ninety houses were completely destroyed by the hurricane. But the inhabitants had all been saved; all but two old colored people, who refused to heed the signal.

The sending of hurricane Paul Reveres by motor cycle and automobile into isolated communities is the plan followed in many cases. Warnings are also flashed to those in danger by telegraph, telephone, and radio. Newspapers publish the warning. Each Weather Bureau office maintains a list of those to be warned. In towns and cities, police and fire departments aid in spreading the news and, in many places, the chambers of commerce maintain standing committees to cooperate with the Weather Bureau in helping hurricane-proof their communities.

Steamship companies either keep boats in port, or go ahead but take advantage of the warnings broadcast by radio in directing their course, so as to minimize the danger.

Railroad companies often run special trains to carry folks and freight back from low sections to higher ground. That is especially necessary some places to avoid the so-called "tidal-wave" which Mr. Tannehill says is no tidal wave at all. The hurricane does pile up the waters of the ocean or the Gulf of Mexico in advance of its center, causing high tides in the bays, and inlets, and river mouths, and over the low coast country. But that rise of water is seldom sudden and overwhelming wall of water such as we usually think of as a tidal wave. The rise of water is usually gradual at first. It gets to mounting faster as the center of storm gets nearer, but there is always plenty of time for the inhabitants to move to higher ground if they heed the warning. In some small communities, trains carry practically every inhabitant away from his home to higher ground.

Other precautions taken are the boarding up of windows to keep out the wind; hustling merchandise in stores on low ground to the rooms above; removing objects from the tops of buildings when it looks as if they might be blown off and hurt somebody in the street below. When the storm gets violent the electric light is cut off to prevent electrocution by bare electric wires.

Another very important thing, folks along the southern coast country have learned and that is to build more sturdy houses, with stronger frames of heavier timber. Few houses built to withstand a hundred mile an hour wind are damaged by the average hurricane.

Livestock often presents a very troublesome problem, in a hurricane. Sometimes the damage is heavy. Mr. Tannehill mentioned one case on the coast, where the habit of cattle of running with the wind led to the loss of a herd of several hundred head. The wind changed suddenly and started blowing out to sea, and the dumb, driven brutes waded right out into the bay and were drowned. Because of the prompt precautions now taken, based on the radio report and hurricane warning system of the Weather Bureau, people along our South Atlantic and Gulf Coasts now feel much greater security from the threats of tropical storms. Not only that, but Mr. Tannehill says, the people in the interior are now beginning to take more serious heed of the Weather Bureau's hurricane warnings.

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ANNOUNCEMENT: Another chat with the weather man this time two weeks from today. These chats come to you through the cooperation of Station _____ with the United States Department of Agriculture of which the United States Weather Bureau is a part.

UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN. RELEASE: Friday, July 22, 1932.

NOT FOR PUBLICATION

ANNOUNCEMENT: Now we have a chat with the Weather Man. Experts of the United States Weather Bureau today give us a suggestion on something we can do about the weather.

---oOOoo---

Mr. B. C. Kadel, in charge of the Instrument Division of the U. S. Weather Bureau, says if you have the time, and an interest in weather you might keep tab on the rainfall. And by measuring rainfall you might do a real service to the country.

As he points out, in the Biritsh Isles there is a rainfall organization the members of which have measured the rainfall of the British Isles for years. They have assembled and published the results of their measurements from time to time. Mr. Kadel says there is a real need for a similar effort in this country. What's more, the need is far greater today than ever before, on account of the growing use of water for power and irrigation.

In this broad land of ours, the Weather Bureau has some five thousand regular rainfall stations. In some sections, such as the Eastern seaboard, stations are close enough to each other to give a fair idea of the general average rainfall in those sections. But in other parts of the country, especially in the less densely populated sections of the West there is real need for many more measurements than are available. Many such thinly settled sections are the source of supply of western rivers. As Mr. Kadel says, water is one of our great natural resources, and it is highly important we should have a survey of how much we have. However, he doesn't urge that the government multiply its rainfall stations, as it is a comparatively simple matter to measure the rainfall, he thinks interested individuals can do it to their own enjoyment, and the benefit of the country.

Of course, folks have been measuring rainfall for hundreds of years. The first rain gauges known to have been used were made of stone. That was over in Korea.

Nowadays, we make them out of metal. All through the world, you'll find metal cylindrical vessels with the top leveled and freely exposed to the sky for catching the rain.

The rainfall is measured on the basis of the depth of water on a level; assuming that none is lost from the time it falls until it is measured.

The custom most widely followed in this country, is to catch the water in a big vessel. Then pour the water that falls into that big vessel into a small vessel to increase its depth, so as to provide a magnified basis for measurement.

For example, Mr. Kadel says you might catch the rain in a washtub, then pour it into a one gallon straight-sided syrup can to measure it, by putting a measuring stick or foot ruler in the water. Of course, there must be a definite relationship in the sizes of the two containers. A wash-tub---syrup can rain gauge would be too crude for accurate practical purposes.

In the regular Weather Bureau rain gauges, the smaller vessel or measuring tube is uniformly one-tenth the size of the larger vessel or container.

The U. S. Weather Bureau rain gauge consists of a metal cylindrical collector eight inches in diameter at the upper end, terminating in a funnel which directs the water into the measuring tube, the diameter of which is one tenth the diameter of the collector.

In Europe, Mr. Kadel tells me, the weather men use a similar funnel to direct the water into a glass jug. Then they measure the water by pouring it into a glass graduate. In some cases, the amount of water is determined by weighing. Ordinarily, however, the weighing method is limited to measuring snow.

And right there, it is well to remember that measuring the water content of snow is a subject closely allied to rainfall measurement. The snowfall which lies in the mountains, feeds the headwaters of many rivers. Measuring that snowfall, Mr. Kadel says, is a problem on which only a beginning has yet been made. Enough has been done, however, he declares, to show that it is practical to appraise the quantity of water available for power and irrigation well in advance of the time it will be used. -----

That is quite another question. - Let's get back to our rain gauge. As we were saying, when it is impossible to make measurements immediately after rainfall, we must provide against loss of water by evaporation. The common method of doing that, is to build a collector in the form of a funnel which directs the water into a narrow necked storage vessel. The Weather Bureau used a collector which is eight inches in diameter at the top. Mr. Kadel suggests, however, that for anyone building his own rain gauge, it would be a good idea to make their rain gauge exactly five and thirty-six hundredths inches in diameter at the top. With a five and thirty-six hundredth inch diameter, each fluid dram of water caught in the collector will correspond to one one-hundredth inch of rainfall. That is very convenient size, because then you can measure the rainfall collected by simply pouring the water into a measuring glass such as you can buy at most any drug store.

If you make a rain gauge 5.36 inches in diameter, and use a funnel, Mr. Kadel points out that the funnel should be nearly or quite three inches deep to prevent outsplashing. The slope of the sides of the funnel should be not less than 45 degrees.

If you want further information on rain gauges and rainfall measurement, you can get it from the circular the Weather Bureau has prepared as "instructions for cooperative observers." That is Weather Bureau Circular No. 843. You can get it for ten cents from the Superintendent of Public Documents, at the Government Printing Office, Washington, D. C.

As you understand, rainfall is often a very local proposition. The United States Weather Bureau with all its five thousand rainfall stations, may never catch or measure the rain in many of the more thinly settled localities of this country. For farmers or engineers or others the rainfall in any particular locality at some distance from the regular Weather Bureau station may be of great practical importance. For example, an engineer called upon to build a sewer big enough to take care of the water without spending too much to build it unnecessarily big, would be greatly helped by knowledge of the exact rainfall in that immediate locality.

However, any of you people who decide to build a rain gauge, Mr. Kadel says, should keep in mind that the rain gauge must be exposed reasonably free to the sky. Small objects twice their own height away from the gauge are not objectionable. Place the rain gauge on the ground, preferably where surrounding shrubbery or low fences break the force of the wind. Do NOT place the rain gauge on a roof, unless, as Mr. Kadel says, you are so unfortunate, as is the Weather Bureau itself, to be compelled in order to render service to a great mass of people to maintain offices in the heart of cities. Under such conditions, the Weather Bureau makes the best of a bad situation, by placing the rain gauge so as to take advantage of the shielding effects of surrounding buildings. The Weather Bureau imitates as far as practical the ideal ground exposure.

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ANNOUNCEMENT: That idea of private individuals measuring rainfall seems to have interesting possibilities. We will have another of these chats from the U. S. Weather Bureau this time two weeks from today.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN Friday, August 5, 1932.

FOR BROADCAST USE ONLY

Speaking Time: 10 Minutes.

ANNOUNCEMENT: Now let's talk about the weather. As a result of our chat with one of the weather men of the United States Weather Bureau, we have picked up some information about weather signs that sounded interesting to us. We hope it will sound that way to you --------

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You know our United States Weather Bureau forecasters base their predictions on weather reports gathered by wire and radio from all over ------- not only all over this country, but all over this continent, and pretty much all over this Hemisphere.

The forecasts based on those reports are made from a considerable spread of country, such as a whole State. Often those forecasts are expressed in rather general terms, but some of our weather, especially in the summer time, is very local in its character. Of course, where there is a local Weather Bureau station, we usually rely upon the forecaster to also supply a local forecast. But some folks are located at some distance from a Weather Bureau office. By radio they get the more general forecasts. These forecasts tell what is likely to happen most places in that forecast area. However, for the strictly local weather, some folks still make their own rough forecasts based on some age-old sign or weather maxim.

Some even seriously note the way the horns of the new moon tip as a sign of rainy or dry weather. That wet and dry moon business is all poppycock, Dr. W. J. Humphreys, of the United States Weather Bureau, tells me.

But he says there are some of the old sayings that do have some value. For instance, there is the old rhyme about dew and dry weather:

"When the dew is on the grass
Rain will never come to pass"

That is sound meterological physics. Dr. Humphreys says the state of the dew in the morning is one of the very best indicators of the weather for the day. As he explains, dew gathers on grass and other exposed objects when they cool enough to condense the moisture out of the air, just as moisture collects out of the air onto the side of a pitcher filled with ice water.

The dew gathers on the grass when the grass cools considerably. Dr. Humphreys says that only happens on still, clear nights; on the kind of night we have during a spell of fine weather. So a heavy dew on the grass means that the air was still and the sky clear, at least during the latter half of the night. It is pretty certain if we had neither wind nor clouds during the latter half of the night, the day will be a good one for all outdoor work. Or in other words,

"When the dew is on the grass
Rain will never come to pass."

On the other hand, as the other old proverb goes;

"When the grass is dry at morning light
Look for rain before the night."

That is, if there is no dew on the grass in the morning, it is almost certain that either the sky was clouded or that there was some wind, or both. Well, Dr. Humphreys says both cloudy sky and wind usually precede a general rainstory by 6 to 12 or even 24 hours, according to the circumstances. So the old saying is not far off:

"When the grass is dry at morning light
Look for rain before the night."

And here is another rain rule that has come down through the years in a rhymed couplet.

"In the morning mountains,
In the evening fountains."

Dr. Humphreys translates that as merely a poetical way of saying that when you see a lot of big cumulus or woolpack clouds in the forenoon you are likely to get a thunderstorm in that locality before nightfall. He explains that those big cumulus or woolpack clouds are caused by surface heating. They are likely to get bigger during the day as the surface heating goes on. By midafternoon one of them here and another yonder usually grows into a thunderstorm with plenty of rain. So the man who wrote those lines expressed a sound meterological truth.

I guess all of us have heard some of the old weather sayings about sun sets. You remember the maxim:

"If the sun set in gray
The next will be a rainy day."

Dr. Humphreys says that is a pretty good guess, too. As he points out, a gray sky is one overcast with a high thin cloud, or just the kind of cloud that runs well ahead of a general rainstorm. At such times, this meterological physicist observes, the clouds commonly grow darker and denser until within 6 to 24 hours it begins to rain.

Then there is the old saw which lays down the rule that when the sun sets in a clear sky the next day is likely to be fair. Or, as Shakespeare made one of his weather-wise characters say:

"The weary sun hath made a golden set
And by the bright track of his fiery car
Gives token of a goodly day tomorrow."

That is as true here today as it was in England some 350 years ago when Shakespeare wrote it. Dr. Humphreys says the reason it is so is because it is

fair weather at the time of the sunset, and fair weather usually lasts two or three days at least and generally longer than that in the summer and fall, when that saying probably got started.

Speaking of showers, however, reminds us of some of those peotical rules for forecasting from rainbows. You know the old one about:

"A rainbow in the morning
Is the shepherd's warning;
A rainbow at night
Is the shepherd's delight."

"Night" of course as used in this bit of meterological verse does not mean after dark, but late in the afternoon. The idea is that a rainbow in the morning is the shepherds' warning of showers later in the day, and a rainbow in the afternoon is a forecast of fair weather. But Dr. Humphreys warns us that is not a very reliable sign. However, he admits it is worth something.

As he explains, we see a rainbow only in a local shower of the thunderstorm type, caused usually by surface heating. If one of those local thunderstorms happens in the early forenoon, it certainly must not have taken much sunshine to start it, and there is likely to be enough sunshine later in the day to cause other showers. On the other hand, if the thundershower doesn't happen until late in the afternoon, that thundershower must have been rather hard to start, and others are not likely to follow that night nor even the next day.

Besides that, Dr. Humphreys says the shower that gives a rainbow in the morning is west of the observer. That is, it is always on the other side from the sun. In the case of an evening rainbow, the thunderstorm is to your east. Since those storms nearly always travel from west to east, a morning rainbow indicates that that shower, at least, is coming. An evening rainbow is evidence that the rain producing it is going farther and farther away and will not come back.

Dr. Humphreys says sometimes the stars also give excellent hints of tomorrow's weather. When they seem exceptionally bright and you can see a lot of them, you know there is not much moisture in the air. Chances are the next day will be fair. But if the stars are dim and growing dimmer, you know that high thin clouds are gathering. Those are the clouds that go before a rainstorm, so chances are the next day will be a rainy day; or, as the old proverb puts it:

"When the stars begin to hide
Soon the rain will betide."

Those are just a few of the old sayings that have real weather lore behind them. Those apply most anywhere. Dr. Humphreys mentions others that differ in different countries and in different parts of the same country. Some first-rate weather signs in the mountains do not occur on the plains. Some on the plains are unknown in the mountains. To be your own best forecaster, you need to know intimately the region for which you are forecasting.

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ANNOUNCEMENT: We will have another chat with the Weather Man two weeks from today. These bi-weekly talks are presented by Station _____ in cooperation with the United States Department of Agriculture, of which the Weather Bureau is a part.

UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN — Friday, August 19, 1932

FOR BROADCAST USE ONLY

Speaking Time 10 Minutes.

ANNOUNCEMENT: And now for another chat with one of the weather men of the United States Weather Bureau. As you know, Station _____ presents these weather chats prepared by the United States Department of Agriculture once every two weeks. The chat today is about the effect of weather on the crops and how we find out about it.

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Yes, sir, today we are going to talk about last week's weather.

Many of us think of the weather that is past as about as useless as last year's bird's nest. We are ready enough to talk about the weather we are getting right now. And we keep a sharp ear open for the forecast of the weather that will be soon. -- That coming weather may upset some of our plans. -- But many of us never give a second thought to the weather that is gone.

Yet when you stop to think of it, the weather last week had its effects on the crops here, there, and everywhere. This crop may have been helped by rain. That crop may have been damaged by drought. Just what did the weather last week do to the crops?

Of course, any wide awake farmer knows what effect the weather has had on his crops, and on other crops in his neighborhood. But how about other places where these same crops are raised? In these complicated days of distant markets and commercialized farming, a farmer may find the market price he gets for his stuff boosted up or pushed down by what happens to other farmers crops a thousand miles or more away.

If we had no way of getting a complete picture of what the weather does to crops in all parts of the country, unscrupulous speculators might be able to start rumors to force down market prices without cause. I say, if we had no accurate, reliable picture of what the weather did to crops all over the country, such rumors might easily be circulated, and all our markets might at times fall victims to such false reports. Fortunately, the weekly weather and crop bulletins issued by the United States Weather Bureau forestall any such rumors that may get abroad. Those bulletins give us the crop weather picture.

Mr. J. B. Kincer, who has charge of that work, tells how we get those bulletins about the weather and what it has done to crops in all parts of the country.

Besides the regular Weather Bureau observers, the Bureau has thousands of crop correspondents who report the weather and its effect in their localities. Take the weather this week, for example. You can look around and see what effect it is having on pastures, and crops of one kind or another. Certain farmers in nearly every locality will do just that this week, as they do every week. They will note conditions to-day, and tomorrow, up to Monday afternoon. Each of those weather and crop correspondents, by Monday night, will drop a post-card in the box telling about the weather effect on crops in his community, during the week ending that afternoon. Farmers from Maine to California will do the same thing. Meteorologists will summarize those thousands of comments into a weekly crops and weather report for each state which will be wired out from the Weather Bureau headquarters at Washington at 10 o'clock sharp next Wednesday morning; just as was a similar weekly summary last Wednesday and every Wednesday.

Yes, that's right. The weather and crop correspondent mails his post card Monday afternoon, and about 24 hours later the complete summary covering all the country is in print and ready for the wires giving the full and accurate word picture of crops and weather for the week ending Monday afternoon. And shortly after that, you probably hear it over the radio.

Of course, I should have said that all those post cards are not mailed direct to Washington. Our mails are pretty fast, but not that fast. The crop correspondents send their reports by mail to their State or section centers. Meterologists at the section centers summarize those reports and forward the summary for that section to Washington by telegraph.

Mr. Kincer says that some section centers have as high as 1500 weather and crop correspondents in the State to supply the reports on the effects of the weather in that one part of country.

In case the farmer cooperating in this work lives too far from the State center for his card mailed Monday afternoon to reach the State center over night, he mails his card to the nearest weather bureau station. That weather station speeds the information forward by wire. All reports showing conditions up to Monday afternoon must be in the State center early Tuesday morning. The complete report giving the weather for the past week and its effect on the crops as observed by practical farmers and other experts will be issued promptly at 10 o'clock Wednesday. And, by the way, these thousands of correspondents furnish reports week after week and year after year as a public service, without expense to "Uncle Sam".

I said that bulletin gives a complete picture of weather and its effect on crops in this country. But Mr. Kincer tells me it does more than that. The weekly crop and weather bulletin also tells what the weather has done to crops in some other countries.

However, this weekly crop and weather report is not the only service designed to keep down wild weather talk which might up-set markets and hurt prices.

At New Orleans there is also published a weekly cotton region bulletin, and at Chicago a corn and wheat region bulletin. Each State center publishes a local weather and crop summary giving information in more detail as to conditions in that particular State or section.

Then there is a weekly cattle-region bulletin published at several central points in the western grazing country. As Mr. Kincer explains, our range lands cover a lot of country. One section may get a severe drought. Another section may get enough rain to supply more than enough food for livestock in that section. Under such circumstances, Mr. Kincer points out, livestock men may ship their stock from unfavorable to more favorable regions. So you see livestock men often need to know the weather and range conditions in all parts of a wide area. Then, too, bankers who lend money to livestock raisers may need information on weather and range conditions in deciding on loans.

With highly speculative crops like cotton and grain it is important to keep even closer check than can be had from reports by the regular Weather Bureau stations and observers. For that reason, all during the growing season in the grain and cotton regions a daily wire service is maintained. Each morning in addition to the regular Weather Bureau reports, each of the district centers in the Cotton Belt and in the Corn and Wheat regions gets special telegrams giving the details as to rainfall, temperature, and the like from a special corps of observers scattered through each district.

Mr. Kincer explains that those extra observers are local men who have been equipped with standard weather instruments. They report to their district center. There are thirteen of those district centers in the Cotton Belt and thirteen others in the Corn and Wheat regions.

The observations made by these men supply the detailed figures as to actual weather conditions. The effect of the weather on the chief crops in all parts of the country is noted in the summaries given in the weekly weather and crop service about which we have already spoken.

And so it is quite a big job to keep track of the weather that has been and the effect it has had.

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ANNOUNCEMENT: Two weeks from now Station _____ will have another of these chats with some of the other weather men of the United States Weather Bureau.

UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN — RELEASE Friday, September 2, 1932

FOR BROADCAST USE ONLY

Speaking Time 10 Minutes

ANNOUNCEMENT: Now for a chat with the weather man at the United States Weather Bureau. By this time next year, the world's weather scientists expect to have completed the most remarkable series of weather observations ever undertaken on this old globe of ours. Today we are going to hear something about that undertaking.

---oooOooo---

Many of you radio listeners attended a balloon ascension in Switzerland a couple of weeks ago. You stood by and heard a scientist on his take-off for a record-breaking upward plunge toward the stratosphere.

Today Mr. Leroy T. Samuels, of the United States Weather Bureau, tells us about plans for other free balloons, equipped with scientific instruments, to go up, up, on up into the rarer heights of the stratosphere until they burst.

Those balloons will carry no human passengers. But as they rise into the upper air, the self-recording instruments which they do carry will send back radio signals giving the measurements of temperature and air pressure to meterologists safely seated at receiving sets on the ground. Yes, that's right. Those balloons will carry radio sets and the thermometers and barometers will send back their own records by radio.-----

However, that is getting a little ahead of our story. Those radio meterographs are just one feature of the world wide observations of the Second International Polar Year, that started last month, and will run until the end of August next year. We are now not only in the last half of the year 1932 and election year, but in the first part of the Second Polar Year, a year that may loom big in the history of weather science.

As some of the older of you may recall, the First Polar Year was just fifty years ago and twelve nations took part in it. The famous Point Barrow and the thrilling Greeley Arctic expeditions were part of our participation in that First Polar Year. That First Polar Year yielded a lot of valuable data about weather conditions in the Arctic and the Antarctic.

During this jubilee year of that First International Polar year in which twelve nations took part, thirty-three countries are taking part in another and more far-reaching program. During the Second Polar Year, meterologists of all thirty-three nations are taking observations at a large number of stations all over the globe at the same time. Those observations include not only work at the regular stations, but observations at a number of special stations, including exploration of many of the blind spots on our weather map, upstairs and down.

Each country taking part in the Second Polar Year takes observations in its own territory. Our meterologists take a number of special observations at various points in our States, and, of course, special Second Polar Year observations along

our northern weather frontier in Alaska. Canadian meterologists make the observations at their northern weather outposts. At the same time, the Russian and Scandinavian meterologists take observations in their Arctic territory.

I guess with cold waves coming down on us from the North in a few weeks now we don't have to be told it is important to know about those Arctic weather conditions. As a matter of fact, however, the interchange of air between the tropics and the poles is responsible in a big way for the circulation of wind currents all over this old globe of ours. Upward currents of air rise higher at the equator than in the Arctic. Cold air flows down from the poles as the hot air rises from the surface in the tropics, loses its heat, and flows poleward.

Mr. Samuels explains that the two main purposes of the observations being made this Second Polar Year are to increase our general knowledge of world meterology, and more specifically to get as many simultaneous observations as possible over vast areas of the earth to study the relationships between weather conditions in the Polar regions and the weather conditions in our lower latitudes.

Of course, that involves not only what happens here at the surface, but at the other levels on up to ten miles or so above us in the stratosphere where meterological conditions are radically different from those at the ground level. In the stratosphere, for example, the temperature averages about 70 degrees below zero and remains practically constant with increase in height, at least, to the greatest heights reached by meterological instruments, viz., 20 miles. Also, clouds rarely occur in the stratosphere and the wind, contrary to the belief of many people, is often very light.

Every day, at five points in the United States, pilots in airplanes equipped with weather instruments make observations of the upper air for use by our regular weather forecasts. This Second Polar Year similar observations are also being made by airplane twice a day at Fairbanks, Alaska. At those six points, we get a complete record of temperature, humidity and pressure conditions at all levels up to about 4 miles. Mr. Samuels says airplanes on the average get records about twice as high with much greater regularity and in less than half the time that it takes to get upper-air records by the use of box kites, which used to be our old standby for such work.

In order to get information about the temperature and pressure higher up than the levels regularly reached by kites and airplanes, the Weather Bureau makes use of balloons carrying automatic temperature and pressure recording devices. In those devices, the expansion and contraction of a piece of metal with changes in temperature actuates a pen or marker which traces the up and downs of temperature on a sheet of paper moved under the pen by clock work.

Those balloons usually go on up into the stratosphere before they burst. Parachutes bring down the instruments and the records, which bear a tag asking the finder to return them to the Weather Bureau. Mr. Samuels informs us that about ninety per cent of the instruments and records used that way in the United States are returned to the Weather Bureau stations.

That system works well in populated countries, but in the rough Arctic where the Weather Bureau aims to collect a lot of upper-air records this Second Polar Year, the chances of getting back the records would be slim.

To meet the need for temperature and pressure measurements in the Arctic at heights beyond where the airplanes climb, the International Polar Year Commission, has supplied each of the countries with a number of radio meterographs to be used with sounding balloons.

In these newer type instruments, the changes in temperature and pressure cause the bending of strips of metal which move a marker on much the same principle as the old clockwork affairs. Instead of making marks on smoked paper, however, a finger of metal is moved across contact points of a compact radio sending apparatus. As the marker touches the different points signals corresponding to the temperature and pressure changes are broadcast to be picked up by the meterologist on the ground.

The United States Weather Bureau has recently received 13 such radio meterographs from the Polar Year Commission and Canada a like number. Our instrument men are now testing and adjusting the signals to the temperature and pressure changes. As soon as the instruments can be accurately calibrated, they will be sent to Fairbanks, Alaska, where a balloon carrying one of them will be released on the same day each month that similar radio meterographs will be sent up into the stratosphere by other nations taking part in this survey of weather conditions aloft.

At the same time, the older type sounding balloons will be released at Dallas, Texas, Ellendale, North Dakota, and Omaha, Nebraska. It may be days or even weeks before some of those temperature and pressure records are mailed in to the Weather Bureau Stations, but with the new type radio instrument, the listening meterologist will get the measurements practically the instant they are made. As the balloon shoots upward, he will chart the different temperatures and pressures through which that baloon passes and from these data the corresponding heights will be computed.

But, as we said, this is only one small feature of a world-wide investigation. Wind direction and movement aloft will, of course, be obtained by means of pilot balloons. There will also be photographic measurements of the aurora, and observations of peculiar cloud formations in the upper air. But we will have to get Mr. Samuels to tell you about some of those other features of the Second Polar Year some other time.

---oooOooo---

ANNOUNCEMENT: You have just listened to a chat with the weather man, about one feature of the cooperation of the United States Weather Bureau in the meterological investigations of the Second Polar Year. Two weeks from today, we hope to hear some more about that work.

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UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN — Friday, September 16, 1932

FOR BROADCAST USE ONLY

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Speaking Time: 10 Minutes.

ANNOUNCEMENT: And now for another chat with the weather man of the United States Weather Bureau. A couple of weeks ago, one of these weather scientists told us about some of the work of the Second International Polar Year, from August 1 this year to August 31, next year. Today we are to hear something more about that Second Polar Year.

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We might start with the lines from the old song;

"Wait 'till the sun shines, Nellie,
And the clouds go drifting by" - - - - -

Only the clouds we are going to talk about are seen mostly at night; up in the Arctic, and higher up in the air than ordinary clouds are ever found. In fact, these rare clouds are one of the mysteries of meteorology.

From all accounts, however, these mysterious clouds are a beautiful sight to behold. Observers have named them nacreous clouds from a French word that means mother-of-pearl. They glow in all colors of the rainbow.

Mr. Leroy T. Samuels, of the United States Weather Bureau, says that a couple of years ago an unusual number of those rare high-flying, iridescent clouds were observed at different places in Norway, Sweden, and Finland. When plans began to be laid for this Second Polar Year, meteorologists saw in it a fine chance to make exact measurements on such remarkable clouds up there in the stratosphere fifteen miles or more up. They planned observations at different parts of the globe, especially in the Arctic and Antarctic where iridescent clouds seem to appear most often. So now our meteorologists and those of many of the other 32 countries taking part in the Second Polar Year are on the lookout for nacreous clouds. Or rather they will be next winter, expecially those of them working in the extreme North.

Mr. Samuels tells me that these mysterious and beautiful luminous clouds appear with certain weather conditions in winter. They are best seen early in the morning before sunrise and late in the evening after sunset, and may remain luminous for two or three hours. As you may have guessed, these irredescent clouds probably get their light from the sun below the horizon. They can even be observed illuminated by the moon. They are beautiful, but that is not their chief interest to the weather men.

Weather men wonder what these clouds are made of. Nacreous clouds fly at heights far above those at which ordinary clouds are formed. It is, of course, uncertain whether the substance forming the nacreous clouds is water, though it is difficult to see what else it could be since iridescence is usually interpreted as indicating the presence of water droplets. If the meteorologists can find out the temperature of the air at the heights of those nacreous clouds, the temperature may give them a clue to the composition of these rare clouds.

The investigators will endeavor to send up balloons equipped with instruments to get those temperature records. Some of those radio meteorographs, by which temperatures at the different heights are automatically transmitted to the listening meteorologists on the ground by means of radio signals may be used to ferret out those facts.

In any case, where it is possible, the meteorologists aim to get accurate measurements of how high those clouds are. They may do that by photography, the same way they determine the height of the Northern Lights, or by theodolite observations from two stations at the ends of a sufficiently long base-line.

For instance, in the observations of the aurora borealis or Northern Lights which form part of this country's participation in this Second Polar Year, scientists at Point Barrow, and at Fairbanks, and at Nome, Alaska point their cameras at the same star and each take a photograph of the aurora at exactly the same instant.

The distance in a bee line between two theodolites (which are somewhat similar to surveyors transit) far enough apart being known, Mr. Samuels tells me, it is possible by triangulation to accurately calculate the height of the clouds from the elevation and azimuth angular measurements of fixed points on the clouds.

Maybe you wonder what difference it makes how high those clouds are?

But I gather from what Mr. Samuels says that is highly important. There are sometimes iridescent clouds seen at moderate heights, which are not those real high nacreous clouds of the stratosphere, but simply the commoner types of Alto Cumulus and Alto Stratus. The meteorologists want to make sure they are dealing with the real thing. But that is merely incidental. They also want to know how fast those hich nacreous clouds are moving. Clouds, like straws, show which way the wind blows, and how fast.

Scientists would very much like to know more about the way the wind blows up in the stratosphere, and how fast. And that air movement is part of this old globe's wind system, a highly important part, of the winds which bring us fair weather and foul, hot waves and cold.

Mr. Samuels points out that theodolite observations of the rare nacreous clouds provide a means of determining the wind movements at heights which can otherwise be obtained only from meteor trails. During this Polar Year all methods of getting facts about the upper air currents will be used to the greatest possible extent.

Of course, the wind direction and velocity in the lower levels of the atmosphere are determined by means of pilot balloons. Observations of small pilot balloons by means of theodolites, made from 2 to 4 times daily at 70 Weather Bureau stations in the United States. These observations show the wind direction and velocity at all levels up to 4 kilometers (2-1/2 miles) or more above the ground. During the Polar Year, pilot balloon observations are not only being taken at our regular pilot balloon stations in Nome, and Juneau, and Fairbanks, Alaska, but also at Point Barrow, the northernmost tip of our Alaskan territory.

The drift of ordinary clouds is also being watched as never before in the history of meteorology. Mr. Samuels tells me 15 stations in the northern part of the United States have been equipped with nephoscopes to make detailed observa-

tions of the drift of clouds. A nephoscope is a black mirror mounted on a circular frame which is graduated in degrees, and provided with a movable sighting device.

That cloud mirror is set out in the open on a level stand where it will reflect as much of the sky as possible. As the image of the cloud drifts across the mirror, the exact direction in which the cloud is drifting can be read with a high degree of accuracy. When the height of the cloud is known, the distance the image moves across the mirror in a given time can be used to compute the speed with which the cloud is moving. The speed with which the cloud is moving is, of course, the speed of the wind at that height.

Those nephoscopes will be used to observe our ordinary clouds every day, during the Polar Year. But, as we have said, the nacreous clouds far up in the stratosphere are not everyday affairs. They occur only under certain conditions. Such rare happenings may prove to be a key to more definite information about the causes behind more usual weather conditions. And the meteorologists will not only note the clouds themselves, and measure their heights and speeds, but will also observe the weather conditions that go along with those clouds.

In some of the northern countries, when any of these rare upper-air clouds are sighted, the fact may be announced by radio so that laymen can join in the observations. Laymen can easily see those beautiful mother-of-pearl clouds and may be asked to report to the nearest Weather Bureau station their description, including such facts as the time, position, and size of any nacreous clouds observed, the colors at different parts of the cloud sheet as well as all of their changes.

As Mr. Samuels explains, cooperation in the work of the Second Polar Year is world wide, and observations on this one rare puzzle of the upper air alone will range from the simple visual studies made by laymen to the collection of data by the latest scientific instruments in the hands of trained meteorologists.

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ANNOUNCEMENT: You have just listened to a short account from Mr. Leroy T. Samuels, of the U. S. Weather Bureau, of one featuer of the work being carried on by meteorologists in this Second Polar Year, extending from August 1, this year to August 31, 1933. In our chats with the weather man, you may hear of other features of the investigations as the Polar Year wears on.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

1.9 Ch

CHATS WITH THE WEATHER MAN

RELEASE Friday, Sept. 30,1932

FOR BROADCAST USE ONLY

Speaking Time 10 Minutes.

ANNOUNCEMENT: And now for a chat with the weather man. This month and last, the weather man must have felt that tropical hurricanes were coming in bunches like bananas. Those hurricanes give our forecasters a lot of anxious moments, but thanks to the men who go down to the sea in ships, we get better warnings nowadays---and thereby hangs a tale-----

--ooOoo--

Mr. Thomas R. Brooks of the Forecast Division of the Weather Bureau tells me that in one of those tropical storms last month a ship riding right out there in the middle of the storm sent in three observations several hours apart that not only gave a perfect idea of the intensity of the storm but enabled the forecaster to calculate the exact direction in which it was travelling and how fast it was moving. This resulted in early warnings to the communities in its path who were told hours in advance where and when the storm would strike.

Yes, sir, and in another of the hurricanes of the past few weeks, another ship sent in its radio report from the very center of another of those tremendous whirlwind storms.

Imagine that ship plunging and staggering through mountainous seas lashed by a gale blowing 80 miles an hour. That was what she was getting when the officer on that ship read his instruments, wrote his report, calmly converted the readings into the weather code words and sent it out by wireless.

Our there in the heart of that howling hurricane, he and his ship were getting rough weather about at its worst. They had their fill of weather. They couldn't use that report. It couldn't help them. But tossed about by wind and wave, in deadly peril from one of those terrors of the tropical seas, a hurricane, that ship's officers were true to the traditions of the sea. They extended help to others.

And Mr. Brooks says that radio message did help other ships at sea and folks along our coast. That message enabled the Weather Bureau to accurately chart the exact path being taken by that hurricane that came so close to Florida before it curved northward and northeastward and swept up our coast sending huge waves tumbling in at Atlantic City and other points. It enabled the forecaster to better tell just what course the hurricane would probably take.

That wasn't the only radio report from ships at sea in those waters. Some twenty-five other ships answered the Weather Bureau's broadcast request for a special report at noon that day. And each day during the hurricane season from June 1 to November 30 anywhere from 25 to 100 ships plying the waters off our South Atlantic and Gulf Coast send in regular reports twice a day giving the barometer reading, the temperature, the wind direction and velocity, and the state of the weather, with the exact position in latitude and longitude of the reporting ship.

Under Mr. Brooks direction those reports are charted on a big map. Especially important are the barometer readings and wind direction reports. They help locate the center of the storm. As Mr. Brooks explains it, a hurricane is a gigantic circular storm or big whirligig of winds. A ship report from nearest the center of the storm will show the lowest barometer reading, and those further and further away from the center higher readings.

In rare instances, the report of an unusually low barometer by a single ship may enable the Weather Bureau men to locate the center of the storm, but ordinarily it is by getting a number of reports from a number of ships that the center is located accurately, although none of the ships may be within many miles of the actual center.

The reports from different ships plying their courses in the seas at various distances around the ocean area in which the storm is brewing show the way the wind is blowing wherever each of those ships happens to be at the regular observation time. When those reports are set down on the map with little arrows pointing the direction of the wind, the circular motion of the winds, counter-clockwise around the storm center, may be clearly seen. The barometer readings are progressively lower as the ships approach the center of the storm.

These gigantic whirls of wind we call tropical hurricanes are many miles across. Of course, that varies. It varies with different storms and at different points along any particular storm's path. Mr. Brooks figures that the average tropical storm that reaches our southern coast in hurricane fury is probably about 75 miles across.

That is, the winds are of gale intensity over that distance. The winds that make up that whirlwind may be blowing 75 to a hundred miles an hour, yet the forward motion of this gigantic whirlwind or hurricane is generally very slow, often only 12 to 15 miles an hour. This powerful weather engine is whirling fast, as the storm itself moves forward in low gear. In fact, Mr. Brooks tells me sometimes the hurricane even stands still. It hovers in one place but the engine keeps spinning with terrific fury.

After a hurricane leaves the warm moisture laden air of the tropics it begins to lose its pep. It loses it fast if it crosses the coastline and moves over land. However, sometimes a hurricane as a distinct storm can be traced thousands of miles. For instance, one of the hurricanes this month was traced from its home in the Caribbean on up past our coast up through the North Atlantic until it was finally lost north of Iceland.

Reports from vessels along the northern shipping routes enabled the Weather Bureau to keep track of that storm. You see, in addition to the special ship service to protect our southern coast and southern waters from hurricanes, the Weather Bureau gets reports from the North Atlantic through the international selected ship service.

That is, a selected list of ships of many leading nations have been chosen by the different countries to make regular twice a day weather reports. The reports are made in an international code. Ships of any of the nations on all the different shipping lanes report the weather to our Weather Bureau by radio whenever they are in the west half of the North Atlantic, and our ships as well as those of other nations report to the other side when in the eastern half of the

North Atlantic. The reports from all the different ships reporting to our Weather Bureau and from selected land stations are consolidated in a report which is broadcast to ships at sea and to Europe for use on the other side.

Many of the ship-masters pick up these reports and from them draw their own weather chart on the map blanks provided by the Weather Bureau. From the weather map charted on the ship the ship's officer can make his own forecast. In other words, the oceans are now dotted with international weather stations, and the men at sea can know the weather over the whole sea and adjacent continents as readily as you can consult the weather tables in your daily newspaper.

Incidentally, those reports of conditions at sea sent in from the scores of ships are included in the weather chart used by the forecaster in making that forecast you read in the papers or hear over the radio. Those sea reports help give him a better picture of what changes may take place in the weather on land.

Radio has added the seas to the weather map and brought on a new era in navigation. The first wireless weather report was received from the steamship New York on September 3, 1905. And the first wireless report actually used in a hurricane warning came from the steamship Cartago, near Yucatan, on August 26, 1909.

Those dates mark the beginning of the new era and the start of a service which has been systematically developed not only by this country but by other countries in all parts of the world. Our land weather service was the child of the electric land telegraph. The great international sea weather service is our radio baby.

--ooOoo--

ANNOUNCEMENT: You have just heard a chat with the weather man, presented by this Station _____ in cooperation with the United States Department of Agriculture. We will have another chat with the weather man two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

Reserve
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CHATS WITH THE WEATHER MAN

RELEASE Friday, October 13, 1932

FOR BROADCAST USE ONLY

Reading Time: 10 Minutes

ANNOUNCEMENT: And now we pause for a little chat with the Weather Man. The Weather Man tells us folks along the Gulf Coast are much annoyed by all of those tropical hurricanes they have been having this year. There's talk of really "doing something about it"----Mark Twain's famous wisecrack to the contrary.

--ooOoo--

Yes, folks in the hurricane belt are experiencing a busy season.

The talk there runs all the way from plans to improve the storm warning service by the use of ship patrols to schemes to snuff out those big storms just like you blow out a candle.

If any of those storm-control schemes work, Mother Nature's reputation as a brewer of storms is ruined. She might as well pack up her storm machinery and cart it away to a museum.

For instance, Mr. I.R. Tannehill, of the United States Weather Bureau, was telling me the other day of one man's scheme to stop hurricanes with a big explosion.

That explosion idea is one of the oldest and most common of all the dozen and one schemes for control of storms. Scarcely a hurricane season passes without somebody suggesting it to the Weather Bureau. The idea seems to date back to early days when sailing vessels began to ply the routes to the East and West Indies. As the story goes, these sailing vessels carried cannon to shoot waterspouts. Waterspouts, you know, are those gigantic columns of wind that whirl over the ocean sucking up mist, spray, and water. Some folks say if the early navigators believed they could break up waterspouts with a cannon, why can't we scatter a hurricane with a blast of dynamite.

As you talk with Mr. Tannehill, you learn of all sorts of objections to such a scheme.

Hurricanes are often a hundred miles or more across. They cover thousands of square miles. Just fancy setting off a blast big enough to break up a storm covering the area of a goodsized state. You probably would jolt a lot of folks out of bed and bring bricks from the chimney raining down on the roof.

Besides, what proof have you that an explosion would have any effect on a hurricane, anyhow? I may not be very scientific in comparing a hurricane with a whirlpool. But I think I can use a whirlpool to illustrate Mr. Tannenhill's idea. Let's take a whirlpool caused by water running down the kitchen sink. If you stir up the water over the drain, the whirling stops for a moment. But the forces causing the whirl are still at work. As soon as the disturbance you caused begins to die away, the whirling starts again.

Maybe the same thing is true of hurricanes.

Mr. Tannehill told me of another scheme much like the explosion idea. One man suggested sucking up the hurricane with a big fan of some kind and a funnel.

But the prize scheme of all comes from a woman who suggest heading off the storms before they start by filling in the Caribbean Sea. Mr. Tannehill looked at that big sea of water down there, half the size of the United States, and said a bit dryly, "Fine scheme---- But it would take an awful lot of dirt."

Some of those ideas and theories are a bit impractical, to say the least. But this year's bumper crop of hurricanes has brought forth another type of suggestions a little closer to earth, so to speak. Mr. Tannehill told me of one suggestion in particular. It was a plan --an old plan, by the way-- to improve the storm-warning service.

Folks who live in those storm zones like to have some idea of just when and where those big hurricanes are going to hit. They have their own lives and often much property to look after before the storm breaks. They look to the Weather Bureau for timely warnings.

For instance, farmers have to pen up their livestock, or drive them to higher ground.

Livestock do a rather peculiar thing during big storms. When it is raining cattle, often start walking in the direction the wind is blowing. They keep walking until they run into something that stops them. If they come to a river, or lake, or the ocean, they walk right in and drown. They do about the same thing in a snow storm. They walk with the wind until they come to a fence, or some other obstruction, and lie down--- and perhaps die.

Merchants in towns on low land along the coast have to take steps to protect their goods. They have to move their stock from the basement and first floor up to higher floors to be out of reach of water from a high tide.

Bathers, campers, and fisherman must have advance warning of storms so they won't be caught in rising water and drowned.

Officials in some coastal towns in the hurricane's path must have time to arrange to transport people from the coast to the interior by rail or automobile.

The railroads must move cars of grain and so on from low to high ground.

Owners of homes and office buildings must board up their windows and take building materials, or anything else, from the roof that might blow off into the street and kill somebody.

So, naturally, folks along the coast are much interested in advance notices about those monster storms that come howling up out of the tropics.

In fact, they are so much interested they are petitioning the Weather Bureau to enlarge its already extensive storm-warning service.

As I told you when I talked with you two weeks ago, the Weather Bureau keeps tab on storms at sea by reports from private ships. Hundreds of vessel masters radio weather reports to the Weather Bureau twice a day as they ply their regular trade routes in certain ocean areas. If a storm seems to be brewing, the Weather Bureau broadcasts a request to all vessels in that vicinity to send in reports. The Weather Bureau also has observers stationed on islands off the coast. From all of these reports, the weather men can follow a storm and get an idea of how bad it is days and days before it reaches land.

But there is this difficulty about getting reports from the private vessels. As soon as a ship runs into one of those tropical hurricanes, or hears about one from the Weather Bureau broadcasts it heads for safe water. It gives the Weather Bureau an account of the storm as it looks back over its shoulder, so to speak.

Some folks say the government ought to put a ship patrol in the Gulf of Mexico and the Caribbean Sea during the hurricane season to report a hurricane as soon as it starts and follow right along in the center of it to keep tab on its course and speed.

Mr. Tannehill tells me such a patrol would be helpful but there are many difficulties.

In the first place, the weather men have no evidence that a tropical hurricane starts just as a little whirl in one spot. The weather men think a hurricane forms in unsettled weather over a big area. So they see no reason for ships to patrol the seas hunting for baby hurricanes that don't exist.

In the second place, a patrol big enough to cover the entire "breeding ground" of the hurricanes would cost a lot of money.

In the third place, sending ships and men into the center of a full-fledged hurricane to follow its course is pretty risky business. The lives you might save on land because of these patrol ship reports on the storm should be balanced against the lives of the crew on the patrol ships, that would be endangered by the terrific winds and tremendous seas of the storm.

And finally, Mr. Tannehill wonders just how much good a patrol ship could do after it got into one of those hurricanes. A wind of 75 or 100 miles an hour would be tossing the ship around like a chip of wood. The storm would now and again change its speed and its direction. Under those conditions, a ship master would have great difficulty in navigating to keep pace with the storm.

At the present time, the Weather Bureau gives storm warnings 12 to 24 hours in advance of the storm. Twelve to twenty-four hours usually is enough for folks to take any of those precautions I mentioned a moment ago. The Weather Bureau is willing to use reports from patrol ships if provided and thinks they would be valuable. But it realizes the many, many difficulties, dangers and the great cost of putting the patrol ship plan into operation.

ANNOUNCEMENT: That was the Weather Man. Two weeks from today, at this time, he will bring you another story about the weather.

UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

Reserve
19
2W3Ch

CHATS WITH THE WEATHER MAN — RELEASE Friday, Oct. 28, 1932

FOR BROADCAST USE ONLY

Reading Time: 10 Minutes.

ANNOUNCEMENT: And here's the Weather Man with another story from those keepers of the weather watch in the U. S. Weather Bureau. Of all the folks who read and hear the daily reports on the weather, no one follows the reports more closely than the former. Just how the farmer uses the weather forecasts is the Weather Man's story for today.

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The joke about the weather forecast probably dates back to antiquity. No doubt when Noah was building the ark he heard the original wheeze about forecasters always guessing wrong. As a wise crack it is like the one about the telephone operator getting the wrong number and the mother-in-law gag--the stock in trade of the boys who try to be funny.

Well, such wise cracks are all a part of the life of a forecaster. He takes them with a smile. But here is what a fruit grower in answer to the joker, says about our weather forecasts.

"I grow fruit. My success in fruit growing depends either upon the weather or upon my knowing in advance what sort of weather I may reasonably expect.... I have been warned (by the weather reports)...of dangerous freezes, and have been able, because of that warning, to prevent very serious losses....We have based our plans for irrigating, for the application of fertilizers, for the use of insecticides, very largely on advance information of expected temperatures, and rainfall, frosts and what not."

Many of you read or listen to the daily weather forecasts mostly out of curiosity. Or maybe you like to know whether you will have to carry an umbrella or raincoat with you to the office.

But, that fruit grower ranks the weather report as a necessity. The fruit grower's business hinges on the whims of the sun and rain, and the winds and storms, and the frosts and freezes. A sudden cold snap or windstorm may wipe out his whole season's work. The grower must have advance reports about the weather; he must be prepared.

As I chat with meterologists at the Weather Bureau, I find that particular fruit grower is only one of millions of men throughout the country who plan their work with the help of the daily forecasts. They also have the aid of special seasonal warnings of various kinds.

I picked up a few examples of how farmers use the weather reports from W. R. Stevens, one of the district forecasters.

Mr. Stevens tells me truck growers and fruit growers are especially interested in the spring frost and cold-wave warnings. If the truck grower hears of a frost

or freeze headed his way, he gets ready to cover his tender vegetables with paper, or cloth, or dirt. The fruit grower starts the smudge pots in his orchard, or runs water into the irrigation ditches, or takes other steps to warm the chilling breath of the frost king.

In the Pacific Coast states alone fruit growers use something around four million heaters in their orchards. They operate these heaters pretty largely on the advices and warnings from the Weather Bureau. A few years ago, the fruit-frost specialists told growers in Southern California an unusually heavy frost would hit them in a day or so. The fruit-frost forecasters cautioned the growers to have extra supplies of fuel oil on hand. The growers got busy and rushed 175 truckloads and 300 carloads of oil into their orange groves. The frost came. The oil heaters saved thousands of dollars' worth of fruit.

Cranberry growers in the northern part of the country take the fall frost warnings as a cue to flood their cranberry bogs. They keep the bogs under water until the weather man says the danger of frost is past.

Thousands of farmers watch the frost warnings to time their fall harvests.

Farmers in the northeastern maple sugar country depend on the spring forecasts to decide when to begin collecting and boiling the maple sugar sap.

Livestock men throughout the country rely on temperature forecasts to plan their butchering and shearing.

Fruit growers in many sections get special fruit spray and harvest weather services. In some parts of the blooming and fruiting season, a disease may attack and damage an apple crop in less than 24 hours if the fruit or blossoms get damp or wet. The apple grower watches the weather forecasts and gives his trees a dose of poisonous spray just before a rain or a long stretch of moist, misty weather.

The Weather Bureau puts out a special forecast on the weather two or three days in advance as a guide to farmers in harvesting their hay, and wheat, and oats, and various other cereal crops. With a little advance warning about a rain, the farmer can prevent a lot of damage to his crops while he is curing the crops and getting them into storage.

In the raisin districts of California, fruit growers keep a close eye on the weather reports while they dry their raisin crop. A little rain will ruin the raisins. When the weather men forecast rain, the growers stack and cover the trays.

Orchardists in the big fruit districts watch the rain forecasts so they can pick their fruit ahead of rains and ship it dry.

Vegetable growers also like to dig their produce before a rain. The vegetables keep much better if they are shipped in a dry condition.

There you have a few examples of how the weather men help the farmer.

But the Weather Man's responsibility doesn't end when the crops and livestock leave the farmer's hands. The Weather Man's warnings protect the produce right on to the market.

For instance, Mr. Stevens tells me if the weather forecasts show a heat wave is on the way, livestock men try to avoid shipping live hogs and cattle long distances by freight.

The railway and transportation companies use the weather forecasts in shipping all kinds of farm produce. If the companies get warning of a cold wave, or a heat wave, they can speed the shipment of the produce, or hold up shipment, or run the cars into roundhouses until the weather is favorable.

In getting those dozen and one warnings and forecasts out to farmers and other folks who handle farm products, the Weather Bureau uses almost every modern method of communication.

The weather men send their news about rain, and snow, and cold snaps, and storms to millions of people through the daily newspapers. They broadcast daily weather forecasts and special warnings and reports over some 300 radio stations. They telegraph weather reports to hundreds of persons throughout the country; these persons in turn pass the reports on to other folks in the community. They send out reports to be posted in postoffices and other public places. In some important farming sections, the Weather Bureau sets up a special weather station during the danger seasons to send weather reports direct to the growers.

And now good-by until this time two weeks from today when we take a trip with the weather man out to sea.

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ANNOUNCEMENT: Thank you, Mr. Weather Man. That was the Weather Man with a story about the weather from the U. S. Weather Bureau. Station _____ will present the Weather Man in another talk two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

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CHATS WITH THE WEATHERMAN

Friday, November 11, 1932

FOR BROADCAST USE ONLY

Reading Time: 10 Minutes

ANNOUNCEMENT: The Weather Man is here again. Today he turns detective and unravels some mysteries of the briny deep. Like a Sherlock Holmes, he pieces together stories of baffling storms and wrecks at sea.

--oOo--

It was a blustery night in January 1929.

Fourteen men put out from Port Arthur, Texas, for Mobile, Alabama, in an ocean-going tug. The tug had a big barge in tow.

The next morning, a ship playing the waters along the Gulf Coast sighted a boat's mast rising up out of the waves. A big barge drifted near by. The crew of the foundered tug had disappeared into the sea. The few men who had been able to get life preservers were frozen to death in the icy wind and waves.

What happened to that tug and crew out there in the Gulf of Mexico after they left Port Arthur?

Nobody seemed to know. Even the weather charts apparently gave no help. The charts showed no important storm in that particular locality that night. Seemingly the wreck would go down on the records as "cause unknown".

Several months later, relatives of the 14 members of the crew sued the owner of the tug for $500,000 damages. The relatives charged the tug was unseaworthy. They backed up their argument with weather records. The highest wind shown in the official record of the nearest weather station on the night of the wreck was only 30 miles an hour. The relatives argued a seaworthy tug would not go down in a 30-mile wind.

In answering the charges, the tug owners showed that the construction of their craft had been approved by government inspectors. The owners held the wreck to be due to an "Act of God"; that is, to weather conditions beyond their control. Under the "Act of God" clause, they could plead for "limitation of damages." In other words, they could say "The tug went down through no fault of ours. We should not be held responsible for lives lost by peril of the sea; we have already lost our investment in the vessel that foundered."

There the case stood: On the one hand, the tug owners held the wreck due to an "act of God." On the other hand, the crew's relatives presented weather records showing no storm of any consequence was recorded on the nearby coast the night of the wreck.

Things looked rather bad for the owners of the tug.

But, as the tug owners pored over the weather records, they began to wonder

Did those records tell the whole story of weather conditions out in the Gulf where the tug went down? The Weather Bureau's stations at Port Arthur and New Orleans are 350 miles apart. Knowing from experience the treacherous nature of storms at sea, and knowing also that ships at sea make reports which reach the U. S. Weather Bureau in Washington they turned to that office for help.

But how could they follow the trail of a storm several months old?

Well, the average person couldn't. But the Weather Bureau has men who know storms like the Indian knew the Buffalo or deer. They have tracked storms for years; know their tricks and habits, and the trail they leave. Given a few stray clues from the weather records, the course and behavior of a storm can be pieced together like the Indian could follow the deer's trail and actions by a few disturbed leaves and twigs. So, W. F. McDonald, in charge of the marine division, was asked to trace down the truth of what happened that night off the Louisiana coast, so that the court might have an unbiased report on which to base judgment.

McDonals secured the weather records of Coast Guard stations along the coast. He studied the logs of ships sailing along the Texas and Louisiana coast on the night the tug was wrecked. Bit by bit, he pieced together the story of weather conditions in the Gulf between Port Arthur and New Orleans where the tug went down.

This, very briefly, is what McDonald told the court:

For two days before the night of the wreck a cold wave moved down across the Great Plains toward the Gulf. The cold air from the Plains lined up against the warm air over the Gulf of Mexico right along the Gulf Coast. In weather language, we call the dividing line between the cold air and warm air the "cold front," and it is generally true that where cold air and warm air are lined up against each other like that---like two opposing armies---something will happen. That "something" usually is rain, and sometimes a cold wave with a "norther" blowing across the Gulf Coast.

In producing that, the cold air simply noses its way along, pushing the warm air back, and at the same time, up. As the warm air rises, it cools off, contracts and so to speak, squeezes out some of its moisture. That moisture falls as rain. Along with the rain, there may be a moderate wind, but not necessarily a storm.

Sometimes, however, this arrangement of cold air below, pushing the warmer lighter air up from the ground or water surface, is forced out of safe relation in a little spot along the general dividing line between the two armies. A mass of cold air pushes in over the top of the warm atmosphere at the surface of the earth. Then things happen! You've seen oil rise from the bottom of a vessel when water is poured on top. Well, there can be a gigantic overturning in the air, by a very similar process, when cold air gets out of its proper place, and is forced to run in over a mass of warm moist air. Violent local storms result, and their violence has nothing to do with the amount of ground they cover. The small, terrific tornado is such a storm.

The violent action may readily turn into a whirl, like the suck hole that forms when water runs out of a bathtub. Such a whirl, beginning on a local scal-

can travel along and enlarge itself as it goes, until after a day or two it may have spread out, under favorable circumstances, into the large circular system of wind, cloudiness, and rain, that appears on the Weather Map as a "low pressure area".

Something like that was what McDonald saw when he put those maps and records together. A story began to unfold. Along the west coast of the Gulf, he found changes in the wind and barometer. Later, the maps showed the wind and barometer change at stations farther and farther east. Those changes evidently took place along the coast about as fast as a storm would travel.

When the disturbance passed along the coast, twenty or thirty miles out in the Gulf beyond Port Arthur, it was just a small but evidently a violent "twister". The diameter of the violent area was not large enough to show up in the wind velocities recorded on the Weather Bureau instruments at Port Arthur.

Further east, at the mouth of the Mississippi River, the records clearly revealed the path of the center, which came very close to a Coast Guard patrol boat that was driven to seek shelter inside the River. The diameter of the storm was greater here, and the wind instruments at New Orleans, fifty miles from the center, showed a higher speed than had been recorded some hours previously at Port Arthur. The next morning, the weather map clearly revealed a vigorous cyclonic storm area, east of the Mississippi Delta, with good strong winds on its outskirts, at Mobile and Pensacola.

So, as McDonald looked back over the weather recordsfor the night of the wreck and the day following, he found a whirling storm born in the afternoon on that "cold front" near Galveston. As it moved eastward, the whirl was too small and too far out from land to be recorded by the Weather Bureau stations but showed up pretty clearly at the Coast Guard Stations. Between Port Arthur and New Orleans, the storm had evidently hit the tug and barge. The tug foundered. The storm passed on, spread out and in spreading its violence over more ground became less dangerous. The weather records at Port Arthur and New Orleans showed no storm bad enough to wreck a seaworthy tug, but the weather sleuth was able to track out the monster that did the tragic deed!

ANNOUNCEMENT: And that, ladies and gentlemen, was the Weather Man's solution of a mysterious wreck at sea. The Weather Man will be with us again two weeks from today with another story from the U. S. Weather Bureau.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN. RELEASE Friday, November 25, 1937.

(FOR BROADCAST USE ONLY)

Speaking Time: 10 Minutes.

OPENING ANNOUNCEMENT: Now for another chat with the Weather Man. Your old friend, Ob. Server, has been to the United States Weather Bureau, has talked with the scientists there, and is now going to tell you a few things between the lines of our daily weather forecast.

--ooOoo--

You read the daily weather forecast at a glance. Or you hear it in a brief moment at the radio.

It is a short, simple statement of what we may expect in the way of weather.

It may just say "Fair and warmer" or "Slightly-colder" as the case may be. But Mr. I. R. Tannehill, of the Forecast Division of the United States Weather Bureau, says that even such simple statements are often misinterpreted, because a lot of people don't understand when it is to be.

Those are not mere vague generalities, as some seem to think. If the forecast says "colder" or "warmer," it refers to a very definite time of the day. "Colder" means for instance that the temperature tomorrow evening at 8 o'clock sharp, Eastern Standard Time, will be lower than at 8 o'clock tonight.

And you will probably read that in your paper or hear it by radio this afternoon, say. In other words, in making that prediction the forecaster really forecasts two temperatures; what it will be at 8 o'clock tonight and roughly what the difference will be between that temperature and the temperature at 8 o'clock tomorrow night.

Forecasts are made twice a day. The forecast which ordinarily appears in the afternoon papers is based on a map drawn from observations taken in the morning. The forecast in the morning papers is that made from the observations taken at 8 o'clock, Eastern Standard Time, the night before. The morning forecast is for 36 hours in advance. The night forecast is for 48 hours in advance.

I say "Eastern Standard Time" because that is the Washington time. The observations are taken at practically the same moment in all parts of the country; but, of course, when it is 8 o'clock Eastern Standard Time, it is just 7 o'clock Central Time; and so on across the country.

On the Pacific Coast that means observations are taken about 5 o'clock in the morning. They have been taken, and charted, and the forecast made, and issued before most folks in the far west are out of bed in the morning.

It takes less than two hours from the time observers in all parts of the country read the instruments at their local stations until the forecast is made and issued from each of the five district forecast centers for each and every one of the States in the Union. In the eastern part of the country, where the observation time is 8 o'clock, that makes it 9:30 to 10:00 o'clock before the morning forecast is issued.

When you consider what's done in that less than two hours, Mr. Tannehill reminds me, you realize that is considerable of a feat. Our weather men are fast workers.

Maybe you will sit down with your newspaper this evening in a comfortable heated room. You will probably throw a glance, as most people do, to the top of the sheet, just to see what the weather will be tomorrow. You most likely won't even think of how the information was collected on which that forecast is based.

I'll admit that until Mr. Tannehill told me about it, I didn't realize that to get one scrap of that information, our westernmost observer, on far-away St. Paul's island in the bleak Bering Sea, got up at 1 o'clock this morning to make his observations. Those records were flashed through Alaska by radio, and put on the telegraph lines at Seattle and sent to the forecast centers throughout the country.

Yes, observations are taken in Hawaii, too. But if you will get your map out, you will find that little island in the Bering Sea is even further west than Hawaii.

And while these messages were coming from balmy Hawaii and Alaska and beyond, observations made at all the other stations scattered throughout this country were also being filed and flashed by telegraph to the district centers. Similar information was also coming from Canada and Mexico.

Those records were entered on a map -- just like one of those weather maps you've all seen. That was done this very morning, and every other morning, at the five district forecast centers, at Washington, New Orleans, Chicago, Denver, and San Francisco.

Then at each of those centers, a forecaster stepped up to the map of charted weather reports. For a few moments, he focused his years of experience and weather knowledge, on that map. Then he made his forecast, which was flashed out over the entire territory by radio and telegraph. And you picked it up by radio or in the paper.

The Washington forecaster made the prediction for all the States bordering the Atlantic and the States of Tennessee, Kentucky, Ohio, and West Virginia as well. The Chicago forecaster made the prediction for the western Lake States, and the upper Mississippi Valley and the Great Plains area. The New Orleans forecaster took care of the Southern plains and Gulf States. The Denver man foretold the condition for the Rocky Mountain Region, while the San Francisco center forecast for the Pacific Coast States.

But you may have noticed that the forecast you heard or read was for your State alone. Mr. Tannehill tells me that now, although the forecasts are actually made at five district forecast centers, a separate forecast is made for each and every State.

In fact, in some of the large States, where conditions warrant it, two separate forecasts are made for different sections of the State. New York, Pennsylvania, and Texas have separate forecasts made for their eastern and western parts.

From what Mr. Tannehill tells me, the United States Weather Bureau is constantly working to get more and more observations from a wider and wider territory on which to make more and more accurate the weather forecasts issued twice a day, for each State in the Union. And just think that whole continent-wide collection of reports and distribution of forecasts is all done in about two hours time.

--ooOoo--

CLOSING ANNOUNCEMENT: Two weeks from today, our old Ob. Server will be back with another of his chats with the weather man. Station _____ presents this feature in cooperation with the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

CHATS WITH THE WEATHER MAN

RELEASE Friday, December 9, 1932

FOR BROADCAST USE ONLY

Reading Time: 10 Minutes.

ANNOUNCEMENT: And now draw your chair into our circle for another Chat with the Weather Man. The Weather Man has cut a wide swath for himself today. He is going to talk with you about rain --he is going to give you a little inside information on just what goes on up there in the sky when the clouds gather and the rain drops start to patter.

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Before I launch upon my story about the rain, I want to test you on a few facts about the weather.

First, I wonder if you know what a cloud is.

I ask that quite seriously. If a child said to you, "Where do clouds come from, and where do they go, and what do they have to do with rain?" just what would you tell him?

While you try to think up an answer to that question, I'll ask you a second and still more complicated question.

Just what causes rain? How do the drops form? Why do we have day after day of cloudy weather without so much as a sprinkle, and then, with scarcely a moment's notice, a terrific downpour?

Well, folks have puzzled over those questions since the days of Adam and Eve. If you can't answer them right off the bat, you won't be much worse off than most other folks. I wouldn't tackle them myself if I hadn't taken a little sight-seeing trip into the clouds with J. B. Kincer of the United States Weather Bureau. But after my flight with Kincer, I began to understand a lot of things about clouds and rain-making that I had never understood before.

Right at the start, I asked Kincer how much moisture the air has to have before it can make rain.

Well sir, right there I got surprise number one.

Kincer told me the air at almost any place in the world and at any time carries enough moisture to make a rain if air conditions are right.

I said, "Do you mean you would find enough moisture to make a rain in the air over the Sahara desert"

He replied, "Yes sir, you most certainly would. In fact, the trade winds blowing down across the Sahara carry more moisture than the winds in many of our

fairly rainy regions. But, while the winds are over the hot, burning desert, they hang on to their moisture like a miser to his gold. However, after they get on down into the tropics, the trade winds let that moisture fall in torrents."

That seemed rather strange. So I asked Kincer just how the wind decided when it would give us a little rain and when it wouldn't.

"Well," he said, "the air above the earth is just like a person. When a person gets warm he gets thirsty; he wants a lot of water to drink. Likewise, when the air begins to get warm, it begins to suck up water from the trees, and fields, and rivers, and lakes, and oceans. The warmer the air gets, the more water it can hold. If the air in this neighborhood today should register zero, it could hold only one-half grain of moisture per cubic foot. But if you heated the same air to a temperature of 60 degrees --- in other words, to a little below normal room temperature--- a cubic foot of air could hold 5 1/2 grains of moisture. As long as the air temperature stays at 60 degrees, a cubic foot of air can hold that 5 1/2 grains of water. But, as soon as you lower the temperature, the air has to let some of its load of moisture drop. If you warm up the temperature from 60 degrees to 80 degrees, the air's water-holding capacity rises from 5 1/2 grains per cubic foot to 11 grains."

That explanation made the rain-making process a little clearer to me.

I said, "So, to make rain, you simply cool the air. For instance, if the air right now is holding 5 1/2 grains of moisture to the cubic foot, we wont get rain as long as the air stays above 60 degrees. But, when the temperature falls below 60 degrees, it's time for folks to put up their umbrellas. Is that right?"

Kincer said, "Exactly so."

But, then, I began to get all balled up again.

If the cooling of the air causes rain, why don't we get a rain every night?

Kincer said, "We don't get rain every night because the ordinary change in temperature from day to night affects only a small mass of air near the surface of the earth. That change may be enough to cause dew---or, if the temperature near the ground is low enough to freeze the dew, the dew turns to frost. But, you never get enough change of temperature in a big enough body of air to make rain. To get rain, you have to move a lot of air from a warm region to a colder region."

Well, that explanation left me even more balled up than before. Wind usually blows from a cold region to a warm region. The cold air from the polar regions blows toward the equator. Heavy, cold air tends to flow into the light, warm air. So how do we ever get rain? While Kincer helps us out, by explaining that you have to think of the process as turned around and move the warm air into the cold air.

He says, "As a general rule, cold air flows into warm air just like water flows down hill. So, it's very seldom that a wind blowing along parallel to the earth's surface brings us a rain. However, remember that air can also move up. Remember, too, that the higher up in the air you go, the colder the temperature.

On top of a high mountain, you find snow the year around. Still higher up, you'd find the thermometer 50 degrees below zero even on the Fourth of July. Most of our rains are caused by warm, moisture-laden air rising up into that colder upper air.

Kincer then went ahead to explain just what causes the warmer air to move up into those colder regions.

First, I might mention the way the air rises to get over a mountain range. For instance, take the wind blowing inland from the Pacific Ocean. When the warm, moist winds from the Pacific reach the Sierra Nevadas, they have to rise. As the warm, moist air rises, it cools. After it cools down to the dew point, it begins to let some of its heavy load of moisture go as rain. As a result, folks on the west side of the mountains get lots of rain. But as the air crosses over the top of the mountain and begins to crawl down the other side, it begins to warm up. Since air always takes up moisture as it gets warmer and never lets any moisture go, folks on the east side of the mountains get almost no rain at all. The country just to the east of the mountains is mostly desert.

But, of course, rains aren't confined to the windward sides of mountain ranges. How does the rest of the country get rain?

Well, Kincer says most of our rains grow out of an air condition known as a "cyclone." When I say "cyclone," don't think I mean one of those violent wind-storms that blow over houses. No, nothing like that. By "cyclone," I simply mean a condition where you find heavy cold air blowing, or hovering, around light, warm air like bees around a hive. The cold air keeps closing in on that light, fluffy warm air. The warm air begins to rise like a cork in a bucket of water. For every mile the warm air rises into that colder upper region, its temperature falls 15 degrees. Pretty soon, the warm air gets so cold it can no longer hold its load of moisture. It begins to let some of that moisture fall as rain---or hail, or sleet, or snow, as the case may be.

Now, no matter what causes the warm moist air to cool---no matter whether the warm air has to rise to get over a mountain, or whether it gets nosed up into the colder upper region by cold air at the earth's surface, the rain-making process is the same.

As the air cools down to the point where it can no longer hold all of its moisture, some of the moisture is forced, or squeezed, out as tiny drops of water. Those tiny particles float around in the air and form clouds. That's all in the world a cloud is--just a whole flock of moisture particles floating around up there together. As the warm air gets cooler and cooler, it squeezes out more and more of its moisture. The clouds get thicker and darker. As the wind blows those moisture particles around the sky, they butt their heads together and form small drops. Finally, the drops get so big and heavy they can no longer float around up there in the air and have to drop as rain. After the air warms up again, the rain stops, and the clouds melt away like snow under a hot sun.

And that's the way Kincer explained to me that age-old mystery about the rain and the clouds.

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ANNOUNCEMENT: That story about the rain and the clouds came to you in the series of talks known as "Chats With the Weather Man." We will join with the United States Weather Bureau to bring you another one of these Chats at this same time two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

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Reserve

CHATS WITH THE WEATHER MAN

RELEASE Friday, Dec. 23, 1932

FOR BROADCAST USE ONLY

Reading Time: 10 Minutes.

ANNOUNCEMENT: Well, the Weather Man is here again, ready for another chat about that biggest of puzzles---the weather. Today, he unfolds a story about how the forecasters go about predicting our rains, and snows, and storms.

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I suppose you glanced at your paper this morning to see what the weather man had to say about today's weather.

I wonder if you know just where that forecast came from.

I also wonder if you know how the weather men went about making that forecast. How does the forecaster tell when we will have rain, or snow, or sunshine? How can he predict weather conditions a day, or even several days, in advance?

Well---to answer that first question---that forecast you read in your paper this morning came from the forecast center for this district. We have five such forecast centers---one at Washington, D. C., and at Chicago, and New Orleans, and Denver, and San Francisco. Those five offices send their forecasts to nearly 2,000 main distributing points. From those distributing points, the forecasts are still further distributed by newspapers, telegraph, and telephone, and radio, and mail.

How do the men at those five forecast centers---or, in other words, the district forecasters---make up their daily forecasts?

That's what I asked Mr. E. B. Calvert of the U. S. Weather Bureau.

Calvert said to me, "Do you see this big map"?

It was a map of the northern hemisphere. I saw the world just as I would see it if I looked down on it from above the North Pole. I could see North America, and Europe, and Asia, and the various islands and oceans.

"That is a northern hemisphere weather chart." Calvert said. "The present-day forecaster bases his weather forecasts upon charts similar to that one, but not all of the forecast centers have charts covering the northern hemisphere, but all of them have charts containing data for the entire United States, Canada and contiguous areas."

I looked at the big map a little more closely. I began to see on the map hundreds of figures, and lines, and little arrows. The United States, and Canada and Mexico, and Europe and Asia, and the various oceans were literally peppered with them.

I asked Calvert what all of the figures and so on meant.

He said, "Every one of those figures and arrows you see on that map represents a report from a trained weather observer. The arrows tell which way the wind is blowing. The figures give the temperature and barometer readings. All in all, that map gives you a fairly detailed picture of weather conditions throughout the northern half of the world."

As I looked at those marks on the map, two questions popped into my head. First, I wondered how in the world a person could get a weather forecast out of all that jumble of lines, and figures, and arrows. Second, I wondered where all of those records came from.

But I wasn't in doubt long. From what Calvert said, it seems that when a trained forecaster looks at that maze of lines, and figures, and so on, he immediately sees what is happening and what is going to happen, taking form. All of those lines, and figures, and arrows tell him a story of storms and weather disturbances of this and that kind throughout the world. As he studies those maps from day to day, he begins to get a pretty definite notion of just where those storms are headed, and how fast, and when they will reach this place and that place, and when they will pass over, and what the weather will be in the state or locality for which the predictions are made.

It occurred to me that, after all, a weather forecaster is simply a man who collects information about weather conditions from hundreds of scouts far and near and passes the information on to the public.

But Calvert smiled when I put that thought into words. "I think perhaps you've made the forecaster's job much simpler than it actually is", he said. "If you gave the average person one of those big weather charts of the northern hemisphere, and told him to predict tomorrow's weather, the average person would be almost completely lost. He might guess after a fashion that a rain or freeze was headed our way. But, unless he understood the physical processes involved, the dynamics of the atmosphere, what is causing rains and snows, why the winds are moving in certain directions, and a host of other facts, his forecast would be almost worthless. However, you are right in thinking that the forecaster must have the daily weather reports you see recorded on that map."

I noticed Calvert said <u>daily</u> reports. I asked him if he meant we got reports from all those places I saw marked---all around through Europe, and Asia, and the oceans---every day.

He replied, "Yes, every day---and from most of those places <u>twice</u> a day."

And he went on to explain just how the Weather Bureau goes about getting the reports from all those <u>hundreds</u> of places."

To make the system clear to me, he started at the beginning of our weather reporting work, and quickly traced for me some of the main developments up to the present time.

Back in 1868 a man named Abbe, working through the Cincinnati Chamber of Commerce, got the Western Union Telegraph company to provide daily weather reports from places along its lines. The company had many offices in the northern

and southern states and as far west as the Rocky Mountains. Likewise, the Army signal corps was pushing its military lines far into the southwest and northwest. His work had a large influence toward the establishing by Congress of a national meteorological service in 1870. At first, very few reports came from west of the Mississippi. The early weather forecasters had to depend on reports from a region no bigger than the range of the telegraph lines. However, year by year, the telegraph crept farther and farther into the new regions of the West and filled in those big gaps in our national weather chart.

But the weather chart of one country---even of a country as big as the United States---isn't enough for the forecaster. He also must know weather conditions to the north of us, and in Mexico, and the Gulf of Mexico, and in the Pacific.

Of course, the Weather Bureau can't have men stationed in all of those places to take weather observations.

As Calvert explained, we have observers at some of our island possessions, but, for the most part, we get reports from beyond our national boundaries through cooperative exchange arrangements of one kind or another.

As you know, about 60 per cent of the northern hemisphere is covered with water. We get reports about weather conditions on the high seas from about 500 ships. Until just recently, the government paid the reporting ships a small fee, but ship masters are appreciative of the service given them by the Weather Bureau and the fee has been cut out for reasons of economy, and they have kept on sending us weather reports just the same as before. The ship captains look upon their reporting as a matter of fair exchange. They send us a report on conditions in their particular neighborhood. Our meteorologists take that report, put it alongside hundreds of others, and then send back to that ship, by means of radio broadcasts reports which show the general weather conditions over the oceans, and accompany it with forecasts for various ocean zones, and storm warnings when necessary. These broadcasts are made twice a day, and oftener when hurricanes or severe storms are in progress.

We also have arrangements to get reports from almost every country north of the equator on weather conditions over the land. These exchanges are made mostly by radio with countries other than those in North America.

The first extensive daily exchange of weather reports with Europe and Asia was received about 10 years ago. In 1922, a representative of the French weather service came to this country to arrange for an exchange of weather reports between the United States and France. The French were to collect reports from about 80 stations scattered throughout Europe and Asia and relay the reports to us by radio twice a day. We, in turn, agreed to collect weather bulletins from about 100 weather stations in the United States, Canada, Alaska, and the West Indies and relay them to the European and Asiatic countries. In April of last year, the broadcasting of the European and Asiatic reports was transferred from France to the powerful English station at Rugby. We broadcast our reports over the big U.S. Navy stations at Annapolis and Arlington. Far eastern reports, including China, Japan, and the Philippines come by way of Manila.

So, you see, one of those big weather charts gives you an almost up-to-the-minute idea of weather conditions at almost any point in the northern half of the world.

When you understand that, you begin to grasp a little of the "mysterious art" of the weather forecaster.

There is nothing so mysterious about it after all.

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ANNOUNCEMENT: And that concludes another Chat With the Weather Man, brought to you through the cooperation of the United States Weather Bureau. We will have another Chat for you at this same time two weeks from today.